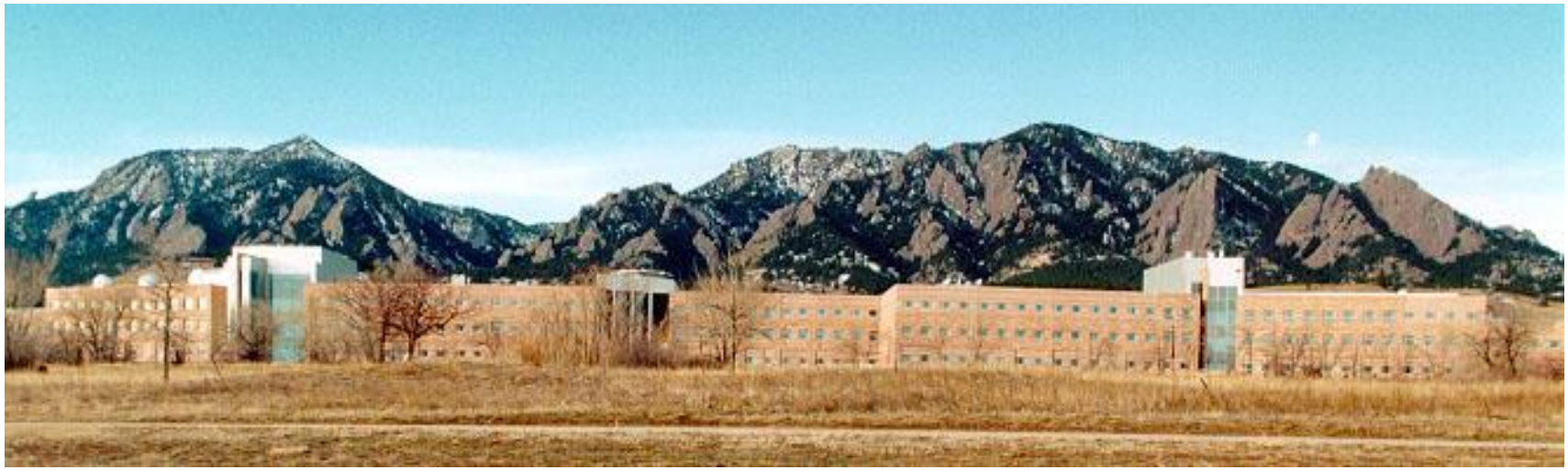


Program Management Review

30 Apr 2007

2QFY07

Dr. William F. Denig, Chief

Solar & Terrestrial Physics Division

NOAA/NESDIS

303 497-6323

William.Denig@noaa.gov

OUTLINE
STP Program Management Review

- **STP Overview/Status (9)**
- **Earth Geophysics Group (14)**
- **Space Environment Group (21)**
- **Earth Observation Group (11)**
- **Concluding Remarks (1)**

WHO WE ARE
STP Overview

Solar and Terrestrial Physics Division
William Denig/F Chief
Janet Brown/F, Secretary

Space Environment Group (SEG)

Eric Kihn/F, Team Lead
- Terry Bullett, AFRL
- Craig Clark/F
- Ray Conkright/C
- Ed Erwin/F
- Justin Mabie/C
- Rob Redmon/F
- Herb Sauer/C
- Dan Wilkinson/F
- Jim Manley/C

Earth Observation Group (EOG)

Chris Elvidge/F, Team Lead
- Kim Baugh/C
- Ara Howard/C
- Ben Tuttle/C
- Vacant – Data Manager/F

Earth Geophysics Group (EGG)

Vacant/F, Team Lead
- Patrick Alken/C
- Karen Horan/F
- Stefan Maus/C
- Rob Prentice/C
- Chris Hammond/S
- Andrew Kimbrel/S
- Don Herzog/C
- Fran Coloma/C

Key
F – Federal
C – CIRES/CIRA
S – Student

Personnel Changes
STP Overview

- **Gains**
  - Fran Coloma – EGG – CORS Data Manager
- **Losses (except re-org)**
  - Ron Buhmann/F (EGG) – Federal retirement: 02Feb
  - Helen Coffey/F (SEG) – Federal retirement: 03Apr
- **Vacancies**
  - SEG/EGG non-Realtime Data Manager – Paperwork submitted [*TBD*]
  - EOG Hayes Replacement – Paperwork submitted [*TBD*]
  - Student Assistant – Paperwork submitted [*TBD*]
- **Inbound**
  - EGG Geomag RA (CIRES PRA) – Candidate selected
  - NGS CORS/GPS Physicist – Candidate selected
- **Pending**
  - Solar Physicist – Approved – starting paperwork (CIRES PRA)
  - EOG/SEG/EGG Realtime Data Manager - Awaiting approval
  - NGS CORS IT Analysist – Pending – NGS action
  - Ara Howard – May be leaving EOG

FY07 Milestones
STP Overview

	PPBES Program	STP FY07 Milestones	Status	Planned Completion Date	Actual Completion Date	Responsible Person
AOP →	Space Weather	Incorporate NGDC Virtual Radiation Belt Observatory into NASA Living With a Star (LWS) program for initial operating capability	C	(Q2) 3/31/2007	(Q2) 3/31/2007	Kihn
AOP →	Space Weather	Demonstrate initial operating capability (IOC) for acquiring, processing and disseminating near real-time total electron content data to NWS/SWPC for US-TEC model	C	(Q2) 3/31/2007	(Q2) 3/31/2007	McLean
	Marine Transportation Systems	Generate 1st global grid of population numbers in povery estimated from satellite imagery	C	(Q2) 3/31/2007	(Q2) 3/31/2007	Elvidge
	Space Weather	Develop database management tools with SPIDR for the NGDC geomagnetic archive	Y	(Q3) 6/30/2007		Kihn
	Space Weather	Develop & release next upgrade (Version 4.0) of the Space Physics Interactive Data Resource (SPIDR)	G	(Q3) 6/30/2007		Kihn
AOP →	Space Weather	Replicate operational GOES-13 Space Environment Monitor (SEM) relational database at NGDC	Y	(Q3) 6/30/2007		Wilkinson
	Marine Transportation Systems	Produce an updated degree-720 crustal field model incorporating newly released marine & aeromagnetic data to improve Electronic Navigation Chart (ENC) nav models	C	(Q3) 6/30/2007	(Q2) 3/31/2007	Maus
	Marine Transportation Systems	Implement near real-timevisible and thermal global mosaic generation and online access system for nighttime DMSP Operational Linescan System (OLS)	G	(Q3) 6/30/2007		Elvidge
AOP →	Space Weather	Integrate Mirrion real-time ionospheric data access system with the Space Physics Interactive Data Resource (SPIDR)	G	(Q4) 9/30/2007		Redmon
	Marine Transportation Systems	Implement at CORS-West the collection of GNSS data for essentially all active CORS on an hourly or daily basis & in a manner that is effectively independent of CORS-East	Y	(Q4) 9/30/2007		Prentice
	Marine Transportation Systems	Implement at CORS-West the OPUS utility to provide an automated GNSS data processing capability to Web clients in a manner that is effectively independent of CORS-East	Y	(Q4) 9/30/2007		Coloma

AOP → AOP milestone

C **Complete**

G **On-track**

Y **Watch Item**

R **Issue**

CDMP FY07 Proposals
STP Overview

Subject	New - FY07	Continuing	POC	Contractor ($K)	NGDC ($K)	Comments
Heat capacity mapping mission		X	Elvidge	26.0	2.6	
DMSP film scanning		X	Elvidge	560.0	113.5	
DMSP P/L Activiation Messages	X		Elvidge	-	-	*Unfunded*
Historical solar spectral data		X	Coffey	*87.0*	8.7	
Cosmic rays - Forbush archives	X		Coffey	-	-	*Unfunded*
Historical solar observations		X	Coffey	*50.0*	5.0	
Historical ionosonde records		X	Redmon	71.0	7.1	
Rescue of historical tsunami data		X	Ikelman			*txfr to MGG*

MOUs / MOAs
STP Overview

STATUS

	Team	Type	Partner	NOAA Legal	DOC Legal	NGDC Signed	Partner Signed	Start	End	Status	
DMSP Archive	SEG	MOA	DMSP	X	X		X	tbd	30-Sep-09	Y	*Awaiting C Fox signature*
SWx Climatology	SEG	MOU	AFCCC	X	X	X	X	27-May-04	01-Oct-14	G	In place - nothing to report
Ionospheric Data	SEG	MOU	AFWA	X	X	X	X	21-Aug-06	21-Aug-11	G	In place - nothing to report
NASIC	EOG	MOU	NASIC	X	X	X	X	09-Mar-06	01-Jan-11	G	In place - nothing to report
CORS Support	EGG	n/a	NGS	X	X	X	X	16-Mar-07	30-Sep-07	G	In place - nothing to report
World Mag Model	EGG	MOU	NGA	X	X	X				Y	*Awaiting NGA signature - info only*
Ionosonde Install	SEG	MOU	USAFA								Initial draft
Ionosonde Site	SEG	MOU	USGS								Initial Draft
CORS Support	EGG	n/a	NGS								Planning

SEC-NGDC Summit
Action Item (AI) Status

AI-1 **Determine which NWS SWx products are archived from the NOAA Weather Wire Service (NWWS)**

Status: Complete – recommend closure

AI-2 **Determine the status of SEC datasets and products archived within NGDC**

Status: Stalled – action currently on SEC to prioritize datasets (stalled)

AI-3 **Establish a Data Interface Working Group (DIWG) to recommend roles & responsibilities for data sharing between SEC & NGDC**

Status: Stalled – GOES-13 PLT; historical GOES magnetometer data; SEC rethinking database replication

AI-4 **Establish an Archive Interface Working Group (AIWG) to address the resource accommodations for current and future (new) SEC data products within NGDC**

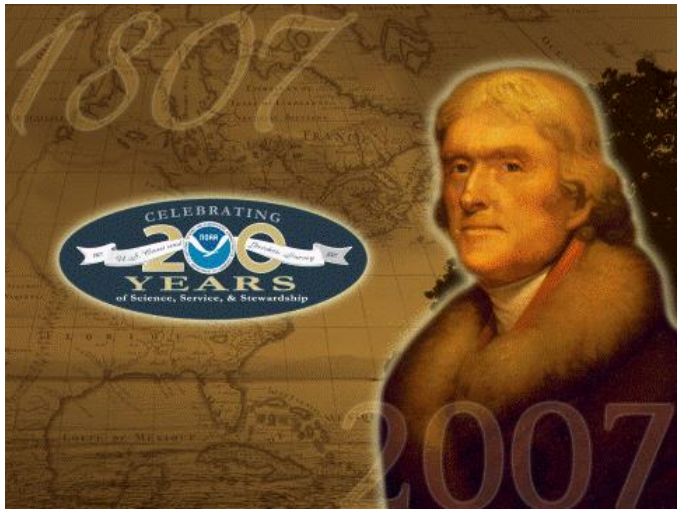
Status: Stalled – Initial focus on GOES-13 – SA planned

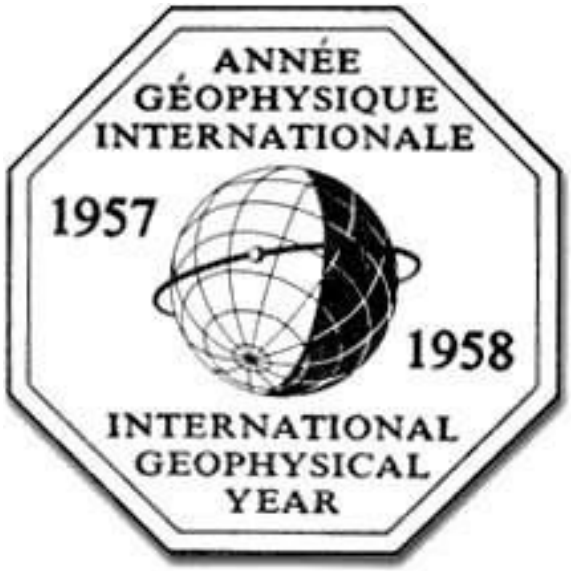
SEC-NGDC Summit
Recommendation to Defer

Background: SEC & NGDC meet annually to discuss interactions between the organizations. This year's summit is tentatively planned for 17 May 07. Last year's summit (08 May 06) resulted in a series of action items which were finally ratified on 08 Dec 06. In the past year only modest progress has been made on most of the action items.

Recommendation: Rather than assemble the full organizations for the annual summit it is my recommendation (as well as that of Kelly Pendergast) that smaller working groups get together to specifically address action items 2-4. I would like for these groups to meet and report out the status of their respective action items during this next quarter.

Info for the Director
NOAA – Celebrating 200 Years: IGY





Rockets, Radar & Computers

The International Geophysical Year

Abstract

The 1957-1958 International Geophysical Year (IGY) was an international effort to coordinate the collection of geophysical data from around the world. It marked the beginning of a new era of scientific discovery at a time when many innovative technologies were appearing. The IGY still lives today in many NOAA programs, databases, and participation in international collaborations. Not only does 2007 mark NOAA's 200th anniversary, it is also the 50th anniversary of the IGY.

Comment - The IGY led to several advancements that live on today. For example, the work of the IGY led directly to the Antarctic Treaty, which called for the use of Antarctica for peaceful purposes and cooperative scientific research. Since then, international cooperation has led to protecting the Antarctic environment, preserving historic sites, and conserving the animals and plants. Today, 41 nations have signed the Treaty and international collaborative research continues.

Article written by Joy Ikelman, NOAA/NGDC

Technology Thrust Areas
STP Overview

- **Earth Geophysics Group (EGG)**
  - Continuously Operating Reference Station
  - Geomagnetic Data & Services
- **Space Environment Group (SEG)**
  - Space Physics Interactive Data Resource
  - Space Weather Analysis
  - CLASS Recon Force
  - Satellite SWx Data
  - Solar Data Services
  - Ionospheric Digital Database
- **Earth Observation Group (EOG)**
  - DMSP Archive, Products & Services

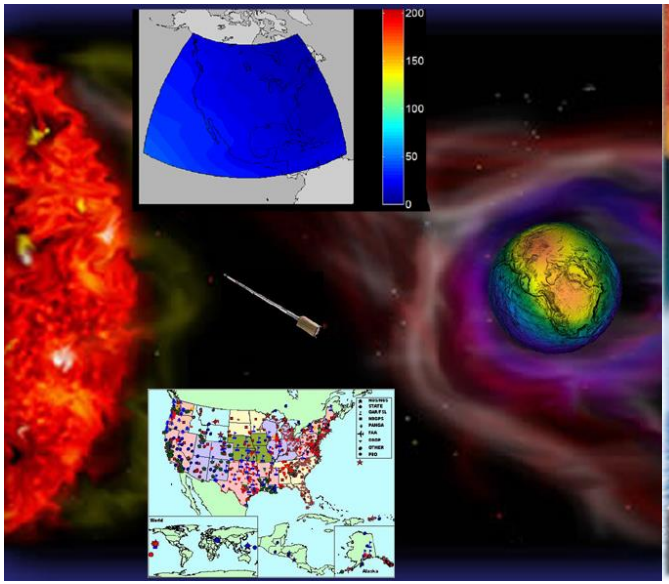
OUTLINE
STP Program Management Review

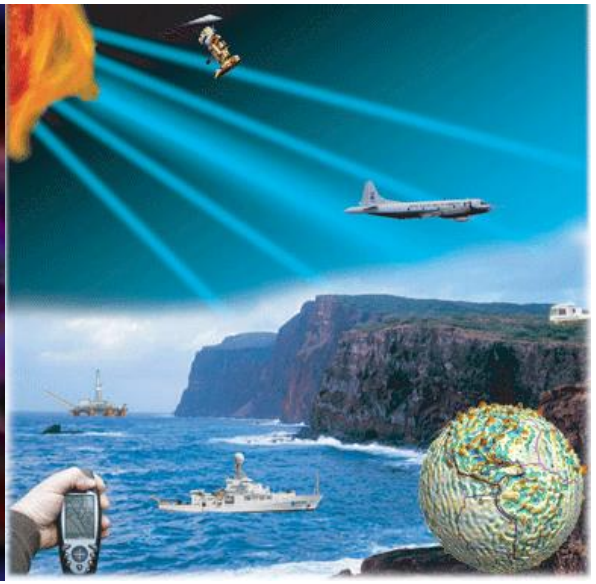
- STP Overview/Status
- Earth Geophysics Group
- Space Environment Group
- Earth Observation Group
- Concluding Remarks

Earth Geophysics Group
Overview

The focus of the EGG is to provide scientific stewardship, products, & services for data from Earth's physical environment supporting safe navigation including magnetic field modeling and CORS-West. The EGG also supports international data collection, exchange and visiting scientists through the WDC for Solid-Earth Geophysics.

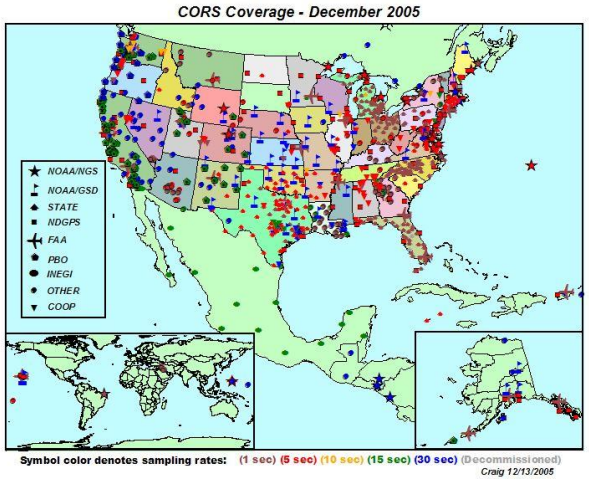
Team Lead: Vacant





STP/EGG Task
Continuously Operating Reference Station

CORS Coverage



Background – NOAA / NGS coordinates a network of continuous GPS receivers for 3-dimensional positioning activities throughout the US and its territories.

Purpose – NGDC operates the CORS-West parallel site as requested by NGS (in Silver Spring, MD). NGDC supplies CORS data in near real-time to NOAA SEC and GSD for use in ionospheric and weather specification and forecast models.

Upcoming Milestones

2QFY07 – Support operational, real-time USTEC product. **[Complete]**

4QFY07 – Implement CORS-West internet collector for GNSS data **[Watch Item]**

4QFY07 – Implement OPUS utility at CORS-West **[Watch item]**

Team Members: Fran Coloma, Bill Denig, Ernie Joynt, Rob Prentice, Karen Horan

Status: Expect new NGS PhD to begin at NGDC in 3QFY07. R Snay requested that NGDC host an additional NGS IT person. J Mader envisions an increasing NGS presence at NGDC. Status of NGS Presidential Management Fellowship employee 6 months is unknown (FY07).

Marine Transportation System program

NGDC Milestone (AOP)
US-TEC IOC

Milestone – Demonstrate initial operating capability (IOC) for acquiring, processing, and disseminating near real-time total electron content data to NWS/SEC for US-TEC model.

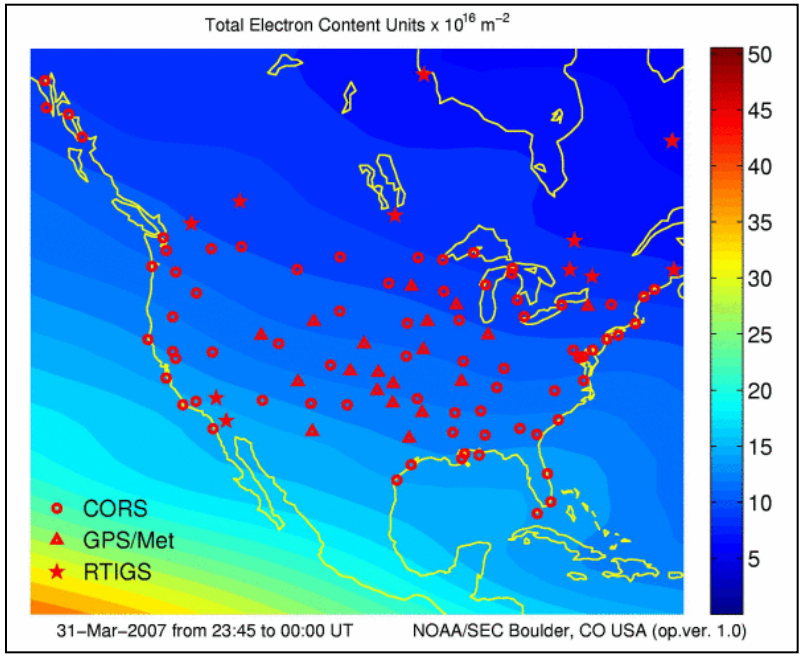
Background – CIRES and the NWS Space Environment Center (NWS/SEC) have developed a new assimilative model using inputs from the NGS Continuously Operating Reference Station (CORS) network and other data sources. CORS real-time data is acquired at NGDC and transmitted to the NWS/SEC for the US-TEC model. IOC was achieved this quarter with verification of the model output. NGDC disseminates the US-TEC model results at http://www.ngdc.noaa.gov/stp/IONO/USTEC/home.html

Completion Date:

Planned: (Q2) 03/31/2007

Actual: (Q2) 03/31/2007

Significance – NGDC plays a central role in supporting the operational implementation of the US-TEC model within the NWS/SEC. Ionospheric Total Electron Content (TEC) data throughout the mainland U.S. are used to improve GPS geolocation and navigation. NGDC in coordination with the NOAA National Geodetic Service (NGS) is part of the CORS Continuity Of Operations Plan (COOP)



STP/EGG Milestone
CORS-West Internet Collector

Milestone – Implement at CORS-West the collection of GNSS data for essentially all active CORS on an hourly or daily basis and in a manner that is effectively independent of the operational status of CORS-East

Background – Collection of CORS data at both locations is via per-station and per-group scripts. This was fine when the number of GNSS receiver sites was below 100. the number of GNSS sites now exceeds 1000 and the overhead associated with the current methodology is very inefficient. The intent is to design, build and implement a communications infrastructure at CORS-West that consolidates many scripts into a single utility that is database driven, efficient, robust and well documented. Following full testing we expect that this capability will be transitioned to CORS-East.

Completion Date - Planned: (Q4) 9/30/2007 Current: (Q4) 9/30/2007

Status – **Watch Item** – Rob Prentice has designed the essential elements of the CORS-West internet collector. He is now ramping up to a 30% effort to support CORS-West activities. This level of support will not support the planned completion date.

Cognizant Person: Rob Prentice Program: Marine Transportation Systems

STP/EGG Milestone
OPUS at CORS-West

Milestone – Implement at CORS-West the On-line Positioning User Service (OPUS) utility to provide an automated GNSS data processing capability to Web clients in a manner that is effectively independent of the operational status of CORS-East.

Background – OPUS is an NGS utility to allows users to submit their GPS data files for corrected and accurate geolocation. Each data file submitted by the user is processed using three (3) CORS reference sites optimized by distance, # of obs, site stability, etc. The positional data is then returned to the user via email. OPUS is currently operational at CORS-East. The intent is to make OPUS operational at CORS-West. Operational implementation of OPUS requires both the OPUS s/w implementation as well as duplication of the NGS Integrated Database (IDB).

Completion Date - Planned: (Q4) 9/30/2007 Current: (Q4) 9/30/2007

Status – **Watch Item** – Not yet started. Details for implementation are pending.

Cognizant Person: Fran Coloma Program: Marine Transportation Systems

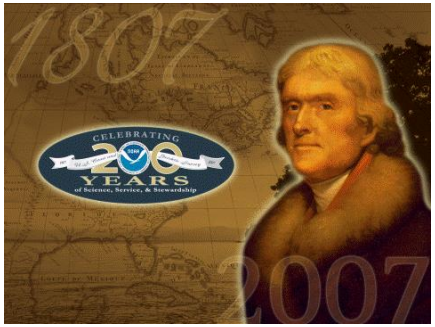
Special Interest Item

NGDC Submits “Postcard from the Field”

Greetings

From

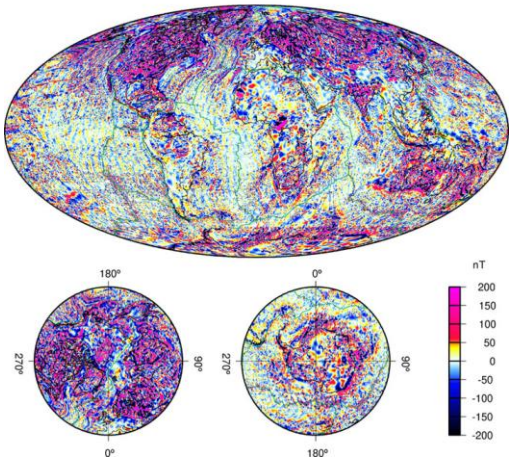
Boulder, CO



This postcard was photographed on March 27 on the rooftop of NOAA's David Skaggs Research Center in Boulder CO. The event was a meeting for the NGS CORS program with members from Silver Spring (CORS-East) and Boulder (CORS-West). The group is standing next to the Boulder CORS GPS antenna.

STP/EGG Task
Geomagnetic Data & Services

Crustal Magnetic Field



Background – The WMM is the standard magnetic model used by US military/civilian agencies and allied nations. The WMM is a product of the United States National Geospatial-Intelligence Agency. NGDC and the British Geological Survey jointly produce the WMM.

Purpose – The WMM satisfies requirements supporting navigation and attitude/heading referencing systems.

Upcoming Milestones

3QFY2007 – Produce an updated degree-720 crustal field model incorporating newly released marine & aeromagnetic data to improve ENC navigation models **[Done]**

Team Members: Stefan Maus, Bill Denig, Tanya Sazanova, Don Herzog, Karen Horan, Patrick Alken, Chris Hammond, Andrew Kimbrel, Sue McLean.

Status: S Maus/P Alken developed new technique to monitor equatorial-ionospheric electrodynamics using CHAMP mag. data. S Maus appointed to Executive Committee of the AGU GP section.

Marine Transportation System program

STP/EGG Milestone
720-degree Crustal Magnetic Model

Milestone – Produce an updated degree-720 crustal field model incorporating newly released marine & aeromagnetic data to improve Electronic Navigation Chart (ENC) nav models.

Background – The study of geomagnetism is one of the oldest of the geophysical sciences. Since before the publication of William Gilbert's De Magnete in 1600, people have tried to unravel the mysteries of Earth's magnetic field. The National Geophysical Data Center maintains archives of geomagnetic data to further the understanding of Earth magnetism and the Sun-Earth environment. Data at NGDC include surface, ocean, airborne and satellite measurements, as well as models of the main field and its secular change, and models of the Space - Earth environment.

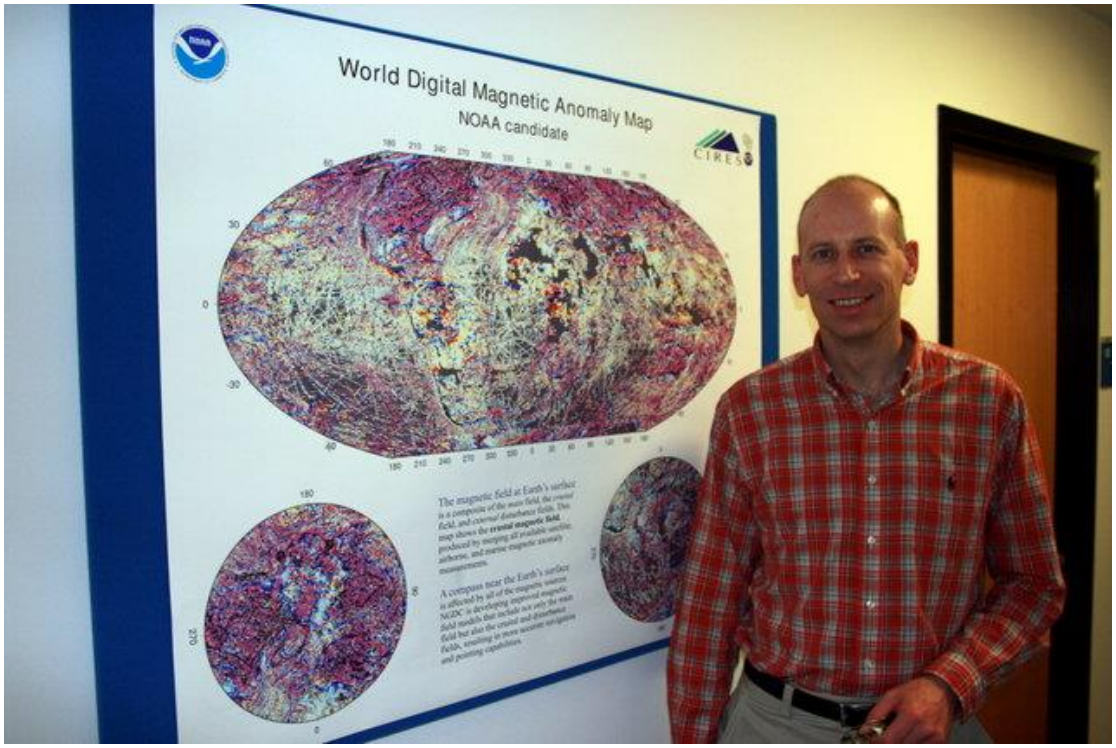
Completion Date - Planned: (Q3) 6/30/2007 Current: (Q2) 3/31/2007 **[Completed]**

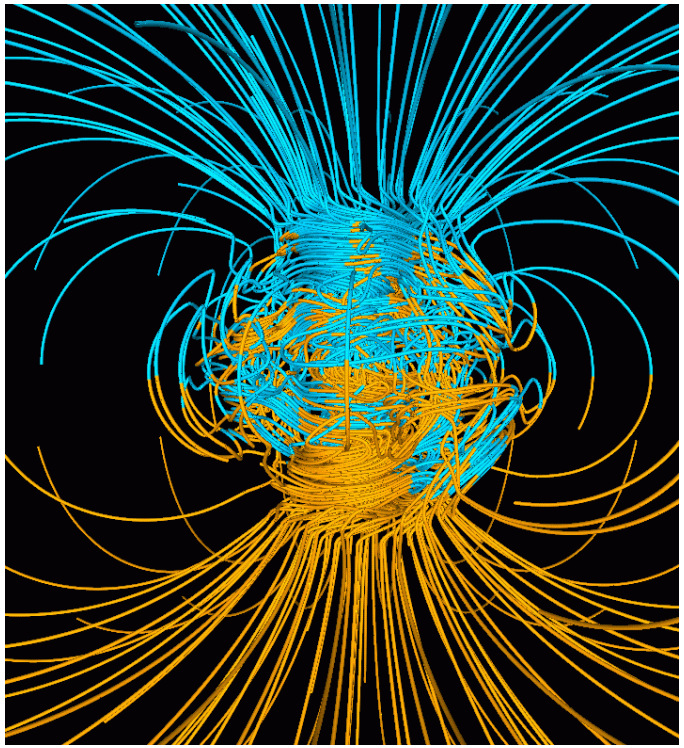
Status – **Done** – Software for the Extended Magnetic Model (EMM-06), including main field, secular variation, NGDC-720-V1 crustal field, magnetospheric field, and induced field is now available for on-line access. The package includes a simple single-point program and a thread-safe multi-processor application which can be adapted to produce large grids and time series.

Web site: http://ngdc/seg/EMM/emm.shtml#coef

Cognizant Person: Stafan Maus Program: Marine Transportation Systems

Special Interest Item
AGU Appointment for Stefan Maus





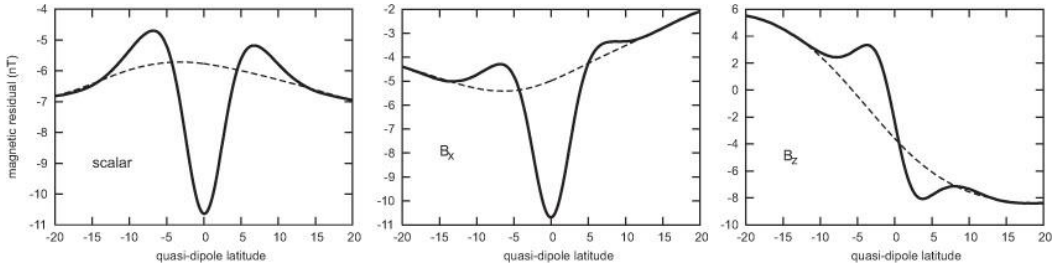
Dr. Stefan Maus (CIRES-NGDC) was recently appointed as the representative for satellite-observed magnetism to the Executive Committee of the Geomagnetism & Paleomagnetism (GP) section of AGU.

Special Interest Item

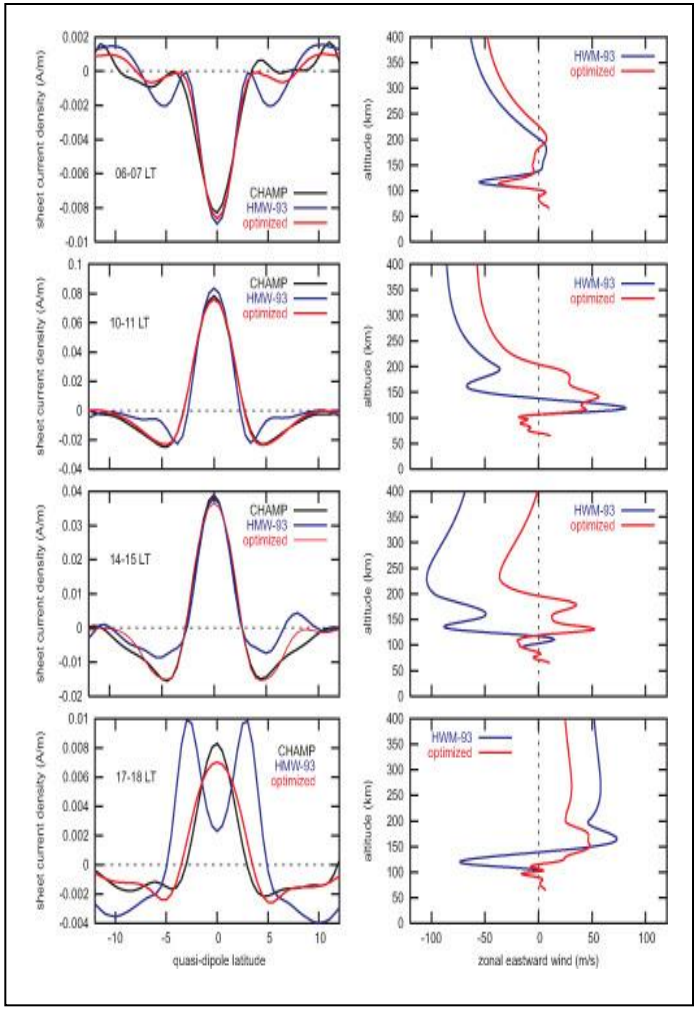
CHAMP - Equatorial Ionospheric Dynamics

Background: Stefan Maus & Pat Alken have used CHAMP magnetic field data to infer the electrodynamics of the equatorial ionosphere. Their technique exploits the accuracy of the CHAMP magnetic data to measure deviations from the local main field and then model the height-integrated current density from which the E-field and plasma motions can be inferred.

Comment: This analysis only possible due to the nT-level accuracy of the CHAMP data which exceeds the capabilities of DMSP and, when it was applicable, the NPOESS satellite.



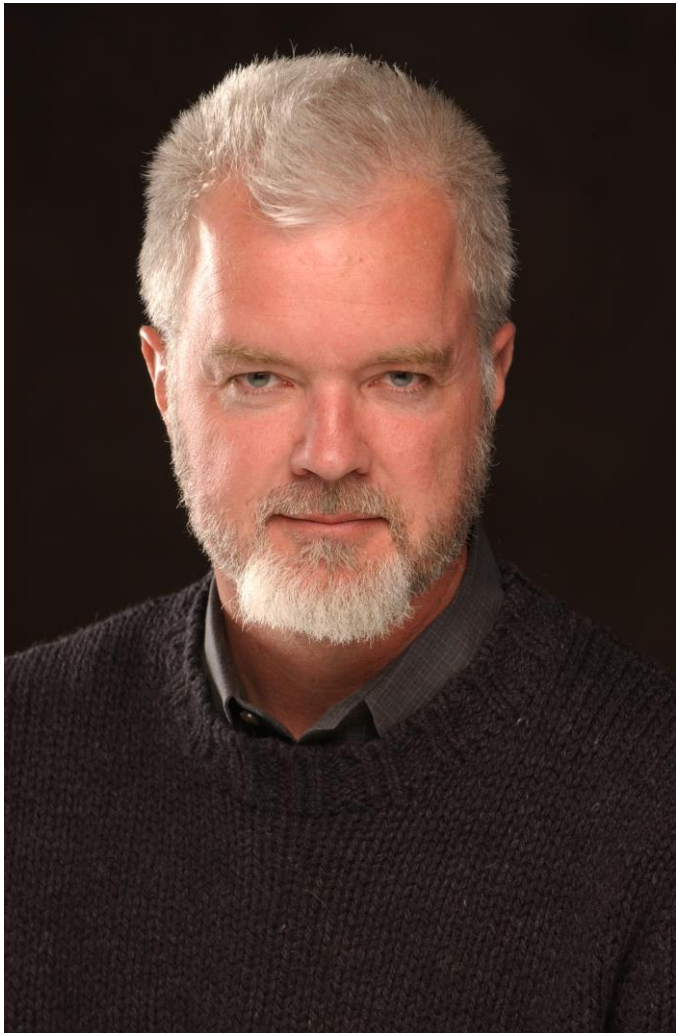
Magnetic Field Residuals (Data – Model)



Inferrred current densities (left) & zonal winds (right) for an optimized data interpretation

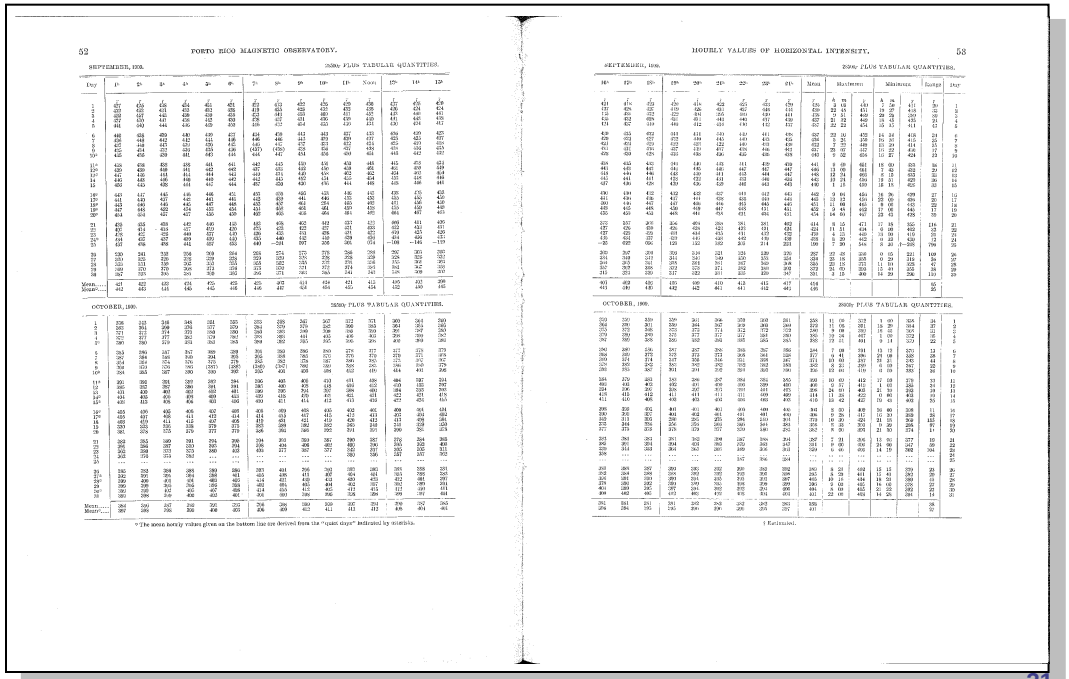
Info for the Director

Extended Visit by Dr Jeff Love, USGS



Dr. Jeff Love
(aka "Karnot the Magnificent")

Jeff Love has reviewed NGDC's historical holdings in an attempt to establish a continuous record of magnetic field measurements for a limited number of magnetic observatories. Dr. Love will convert these records from paper and microfiche to digital form and use these data to develop a long-term (>100 yr) record of Dst. NGDC will receive copies of the digital records.


52 PORTO RICO MAGNETIC OBSERVATORY.

SEPTEMBER, 1930. 2530γ PLUS TABULAR QUANTITIES.

OCTOBER, 1930. 2530γ PLUS TABULAR QUANTITIES.

HOURLY VALUES OF HORIZONTAL INTENSITY. 53

SEPTEMBER, 1930. 2530γ PLUS TABULAR QUANTITIES.

OCTOBER, 1930. 2530γ PLUS TABULAR QUANTITIES.

STP PMR – 30 Apr 2007

Info for the Director
ISO Standard for Magnetic Model

Space Environment Technologies
Advanced Space Weather Products and Services

ISO International Organization for Standardization

Dr. Kent Tobiska, President of Space Environment Technologies and US delegate to the ISO Technical Committee for the Space Environment visited NGDC on and gave a presentation on procedures and standards characterizing the space environment. He pointed out the importance of ISO standards to guide the space engineering community. In subsequent discussions, Dr. Tobiska encouraged the NGDC's Solar and Terrestrial Physics Division to initiate an ISO standard for the Earth's main magnetic field. Such a standard would describe the principal characteristics of a main field model, providing assistance to the users of the International Geomagnetic Reference Field and the World Magnetic Model. Dr. Tobiska offered his guidance and support for an NGDC initiated standard on main field models in the relevant ISO committees.

Accomplishments
Earth Geophysics Group

- **Stefan Maus appointed to Executive Committee of the GP section of AGU**
  - ✓ **Supports CIRES/NGDC leadership in Magnetic Field Mapping**
- **Successful discussions with Kent Tobiska on standards for environmental models**
  - ✓ **Resolved issues related to identifying standard magnetic model**
  - ✓ **Spurred efforts to include IGRF as an ISO standard**
- **Pat Alken successfully defended his master's thesis at UoC**
  - ✓ **Accepted into PhD program – continue working with Stefan Maus**
- **Successful visit by NGS for CORS-West activities**
  - ✓ **Clarified roles & responsibilities regarding the CORS data archive**
  - ✓ **"Postcards from the Field" photo opportunity for the 200th**

Issues & Concerns
Earth Geophysics Group

- **Outstanding / Pending Vacancies**
  - Paperwork submitted for non Real-Time Data Manager
  - Don Herzog reducing time to 60% effort
- **Issues related to Geomag data in SPIDR not fully resolved**
  - Slow implementation of improved access tools
  - Need to clearly identify degree pedigree (provisional vs final)
- **Supporting Real-time Operational USTEC**
  - Single points of failure in acquisition & transfer of GNSS data

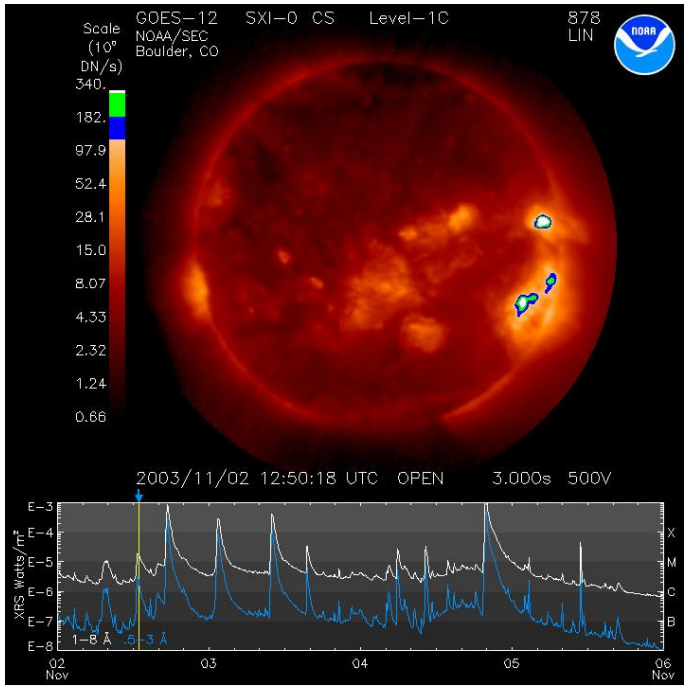
OUTLINE
STP Program Management Review

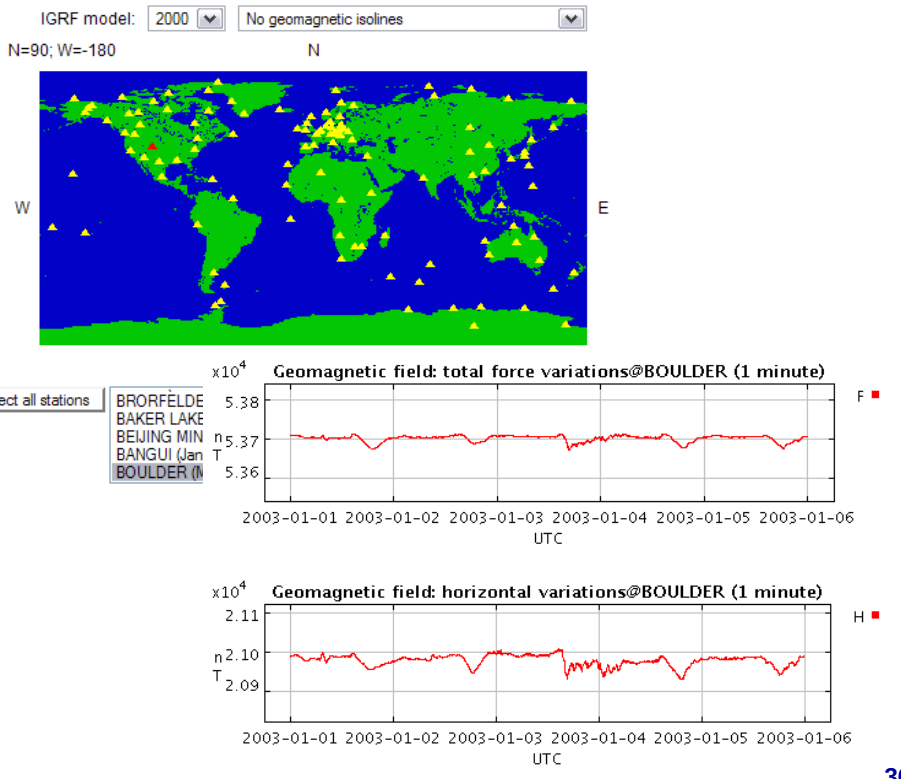
- STP Overview/Status
- Earth Geophysics Group
- Space Environment Group
- Earth Observation Group
- Concluding Remarks

Space Environment Group
Overview

The Space Environment Group is focused on the archive and management of NOAA's space environmental data. The SEG also supports international data exchange and collection through World Data Center activities.

Group Leader: Dr. Eric Kihn





Special Interest Item
Solar Maximum Predictions

NEWS FROM NOAA
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION • US DEPARTMENT OF COMMERCE

For Immediate Release: 25 April 2007

The next 11-year cycle of solar storms will most likely start next March and peak in late 2011 or mid-2012 – up to a year later than expected – according to a forecast issued today by NOAA's Space Environment Center in coordination with an international panel of solar experts.

Other reports (active links):

- ***Federal Government Announces End of the World In 2012***
- ***NASA Confirms Solar Storm Near 2012***
- ***Solar maximum expected in 2011-2012***

"Distinguished" Panel Member

Special Interest Item
Economic & Social Benefits: Space Weather

Economic & Social Benefits of NOAA Data Products & Services

Space Weather refers to conditions on the sun and in the solar wind, which can cause disturbances in the outer layers of the Earth's atmosphere. Highly energized particles from the sun disrupt the upper layers of the Earth's atmosphere, causing geomagnetic storms that result in increased radiation and rapid changes in the direction and intensity of the Earth's magnetic field.

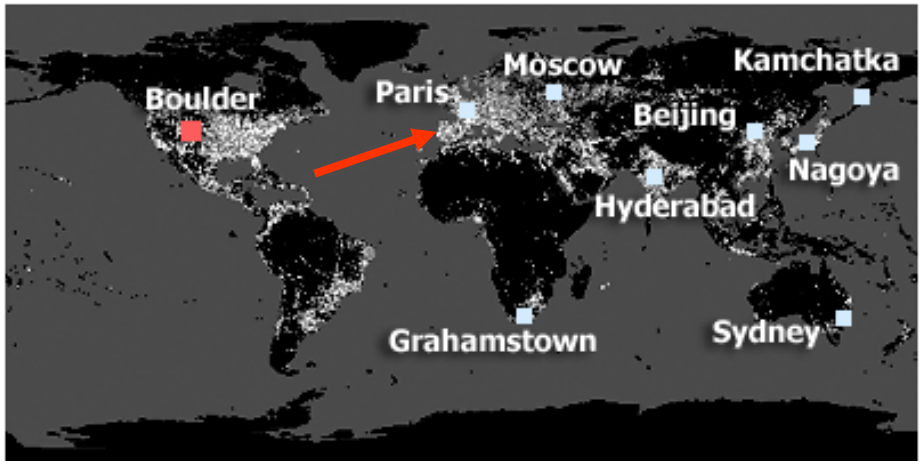
Economic Benefits: "The economic benefits of providing reliable warnings of geomagnetic storms to the electric power industry alone would be approximately $450 million over three years."

Economic Costs: "Our estimates suggest a potential economic loss of $70 billion for lost revenue ~44 billion and satellite replacement for GEO satellites ~24 billion caused by a "once in a century" single [geomagnetic] storm similar to the 1859 superstorm."

W&W Applications: "There could be profound implications for the integrity of the electrical transmission grid if space weather alerts were not available."

STP/SEG Task
Space Physics Interactive Data Resource

Global SPIDR mirror sites



SPIDR nodes as of January 2007.

Background – SPIDR is a distributed network of synchronous databases and 100% Java middle-ware servers accessed via the World Wide Web. SPIDR 4.0 is in test phase.

Purpose – SPIDR allows a solar terrestrial physicist to intelligently access and manage historical space data for integration with environmental models and space weather forecasts.

Milestones

- **2QFY07** – Incorporate ViRBO into NASA LWS program for IOC **[Done]**
- **3QFY07** – Develop database management tools with SPIDR for the geomagnetic archive **[Watch Item]**
- **3QFY07** – Develop & release SPIDR 4.0

➡ Milestone in the AOP

Team Member: Eric Kihn, Rob Redmon, Mikhail Zhizhin, Don Herzog

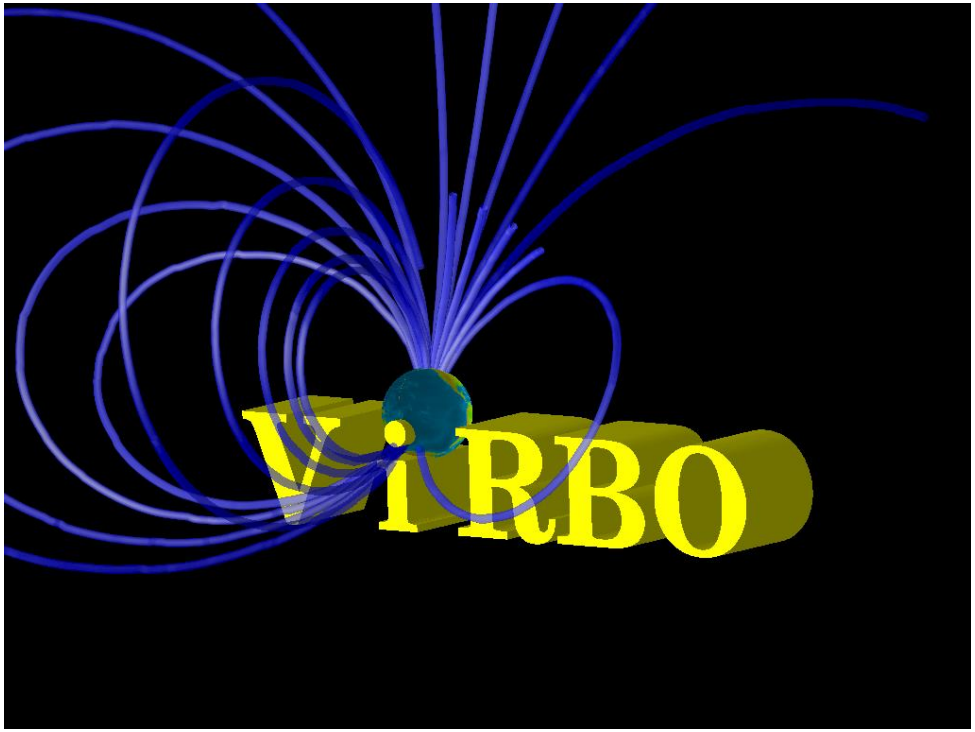
Status – A new SPIDR node has been installed at the Center for the Study of Terrestrial and Planetary Environments (CETP), Pierre Simon Laplace Institute in Paris (http://spidr.cetp.ipsl.fr/spidr). SPIDR is currently undergoing extensive redesign for release 4.0.

Space Weather program

NGDG Milestone (AOP)
Incorporate ViRBO into NASA LWS

Milestone – Incorporate NGDC Virtual radiation Belt Observatory into NASA Living With a Star (LWS) program for initial operating capability.

Background – NGDC is developing the VIrtual Radiation Belt Observatory (VIRBO) in support of the NASA LWS program. The principal objectives of VIRBO are to enable scientific discovery and support satellite hazard mitigation by providing a gateway for scientists, operators and engineers to high-quality, calibrated radiation belt data and model output in a unified form along with analysis tools. VIRBO will be the key access tool for LWS Radiation Belt Storm Probes (launch in 2012). The foundation of VIRBO is the NOAA Space Physics Interactive Data Resource (SPIDR).



Completion Date:

Planned: (Q2) 03/31/2007

Actual: (Q2) 03/31/2007

Significance: NGDC has a lead developmental role in the development of virtual observatories for space physics. VIRBO leverages the considerable NGDC expertise in advanced archive & access tools and techniques.

STP/SEG Milestone
Geomagnetic Database Tools

Milestone – Develop database management tools with SPIDR for the NGDC geomagnetic archive.

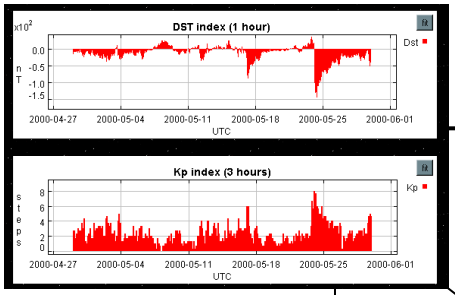
Background – Don Herzog (EGG) has proposed requirements for the “look and feel” and performance of the online geomagnetic archive. SEG is developing the tools and capabilities within SPIDR to address these requirements.

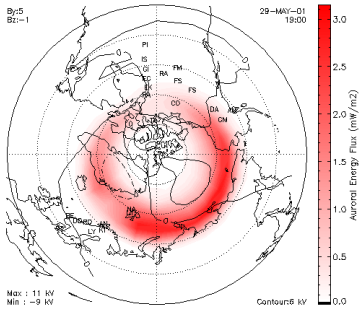
Completion Date - Planned: (Q3) 6/30/2007 Current: (Q3) 6/30/2007

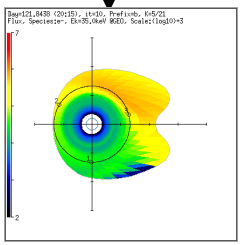
Status – **Watch Item –** Don Herzog continues to test prototype system and provide guidance to system developers. Efforts are continuing but at a slower than desired pace.

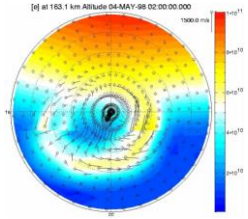
Cognizant Person: Eric Kihn Program: Space Weather

STP/SEG Task
Space Weather Analysis









SWA Data Flow

Purpose – The objective of this project is to generate a complete 16-yr space weather representation using physically consistent data-driven space weather models. The project will create a consistent, integrated, historical record of the near Earth space environment by coupling observational data from space environmental monitoring systems archived at NGDC with data-driven, physically based numerical models.

Upcoming Milestones

None.

➡ Milestone in the AOP

Team Members: Eric Kihn, Rob Redmon and Aaron Ridley

Status – AF/CCC has funded SEG to expand the time frame for the SWx climatology study. Justin Mabie presented a paper the Fall AGU meeting titled, “Analysis of the Simple Inner Magnetosphere Model” (SM53A-1432).

Space Weather program

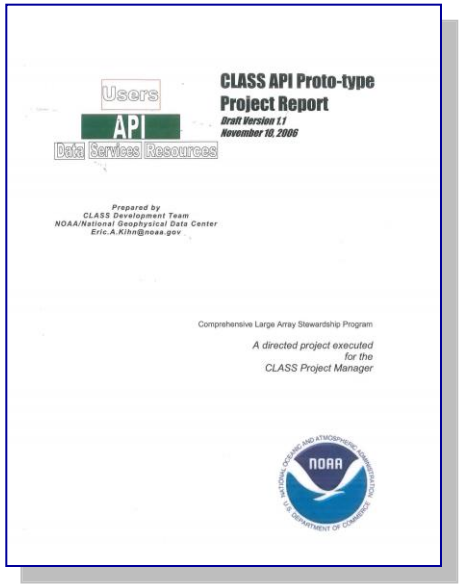
STP/SEG Task
CLASS Recon Force

Comprehensive Large Array-data Stewardship System (CLASS)

Background – CLASS is the archive and distribution system for NOAA's large array data. NGDC is getting a node.

Purpose – NGDC would like to rapidly proto-type and develop an "open-CLASS" architecture capable of integrating many of NGDC's diverse data sets with the CLASS-ADS.

CLASS API Proto-type Project Report
Draft Ver 1.1
10 Nov 2006



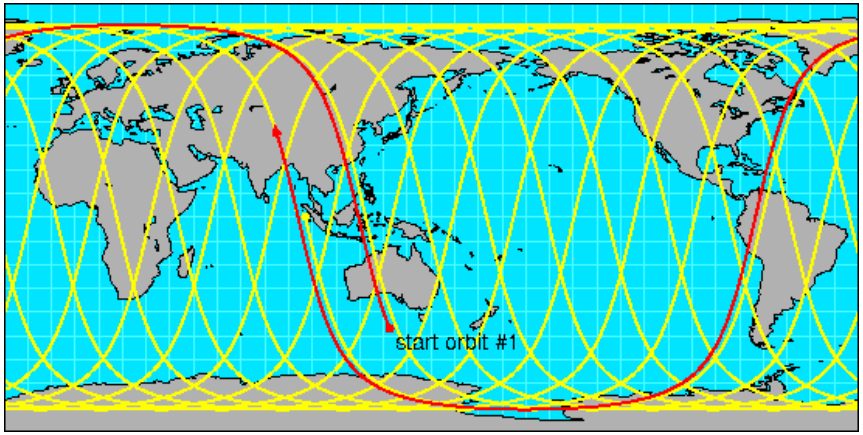
Team Members: Eric Kihn, Rob Redmon, Rob Prentice, Mikhail Zhizhin, Ted Habermann

Status – SEG has been funded to develop Application Program Interfaces (APIs) for CLASS. API code development was completed in 1QFY07 and the products, with associated documentation, delivered to the CLASS program office in Nov 2006.

Space Weather program

STP/SEG Task
Satellite SWx Data

POES daily orbits



Background – NGDC maintains a 30-yr historical database of satellite SWx data from DMSP, POES, GOES, and MetOp (new) data

Purpose – Satellite data are used to determine extremes in SWx conditions and monitor long-term variations in the space environment. These data are also used in specific case studies in coordination with other space data.

Upcoming Milestones

⇨ **3QFY07** – Replicate operational GOES-13 Space Environment Monitor (SEM) relational database at NGDC. **[Watch Item]**

⇨ Milestone in the AOP

Team Members: Dan Wilkinson, Ed Erwin

Status: The GOES-13 relational database has been replicated within NGDC although SEC is now re-evaluating this data transfer mode. MetOp raw data ingest & archive continues. NESDIS is working an innovative commercial approach for acquiring solar-wind data with an option for an coronal mass ejection (CME) imager.

Space Weather program

STP/SEG Milestone (AOP)
Mirrion Integration with SPIDR

Milestone – Replicate operational GOES-13 Space Environment Monitor (SEM) relational database at NGDC.

Background – Initial efforts have been completed in replicating the GOES-13 database to NGDC. The goal is to replicate the GOES-13 database within NGDC to facilitate more timely user access to the SEM data/

Completion Date - Planned: (Q3) 6/30/2007 Current: (Q3) 6/30/2007

Status – **Watch Item** - After accomplishing an initial replication of the GOES-13 relational database, SEC has now expressed some reluctance in fully replicating the GOES SEM database at NGDC. The basic concern is the different database management systems used by NGDC (MySQL) and SEC (SQL Server). SEC prefers to rely on flat files for the transfer of data from SEC to NGDC. This issue should be address by the Archive Interface Working Group (AIWG) – see Summit AI #4.

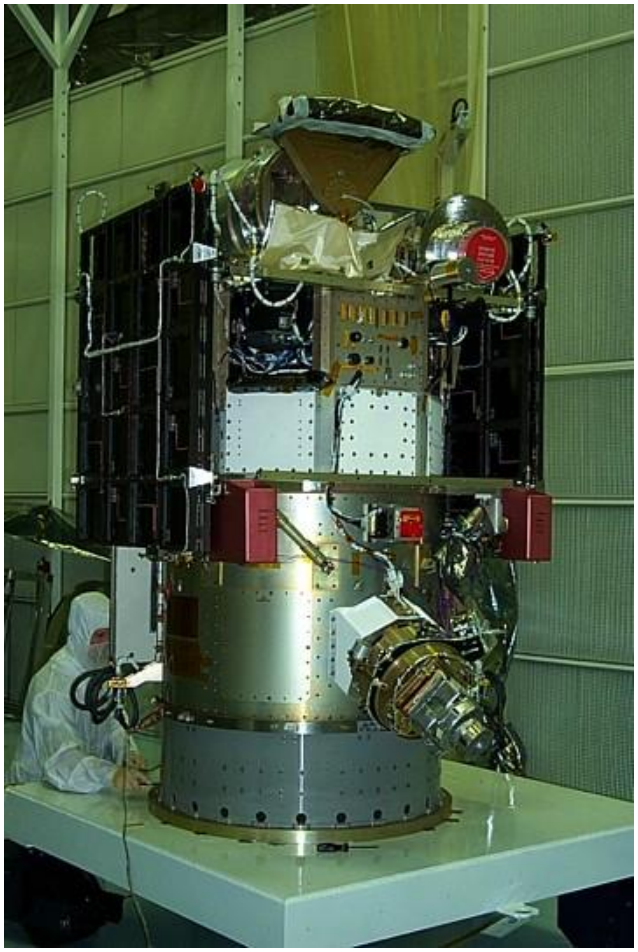
Cognizant Person: Dan Wilkinson Program: Space Weather

Info for the Director
Alternative Sources of Solar Wind Data

Background: Dr Eric Kihn and other NGDC staff (Chris Fox & Bill Denig) participated in a briefing by Space Services Inc. (SSI) on their initiative to "sell" space weather data to NOAA. Mr Charles Chafer (CEO) represented SSI along with several supporting team members, including former DOC Assistant Secretary, the **Honorable Kenn George**. Mr Chafer presented the business case for industry to partner with the USG to obtain in-situ solar wind data and coronagraph imagery at or near the L1 Lagrange point with the "mothballed" NASA DSCOVR satellite. Other briefing participants included SEC (Tom Bodgan), the Weather & Water Team Leads and Ms Mulligan & Mr Diedrich (NESDIS)

SSI of Houston, TX is best known for providing memorial spaceflights for several high profile individuals (Actor "Scotty" James Doohan and astronaut L. Gordon Cooper, Jr).

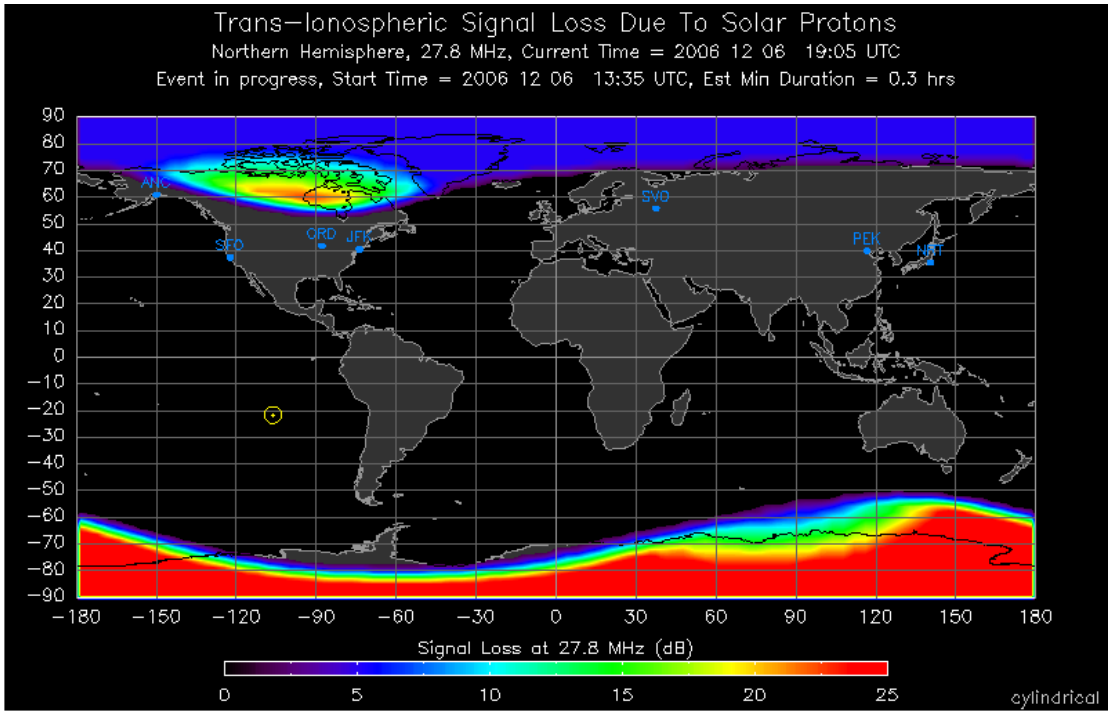
Significance: Continuity of solar wind data is of vital interest to NOAA's space weather program. An industry-Government partnership option using the DSCOVR spacecraft is lower risk than using a commercial only approach.



NASA's DSCOVR spacecraft formerly Triana also "GoreSat"

Info for the Director

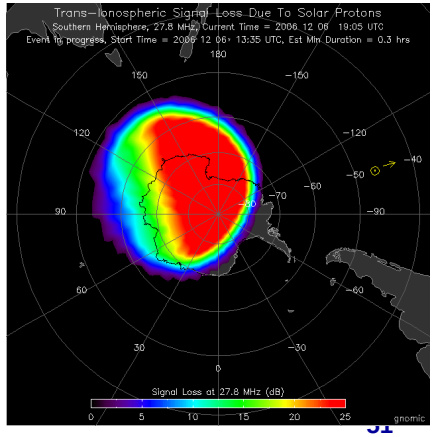
NGDC Develops New SWx Capability



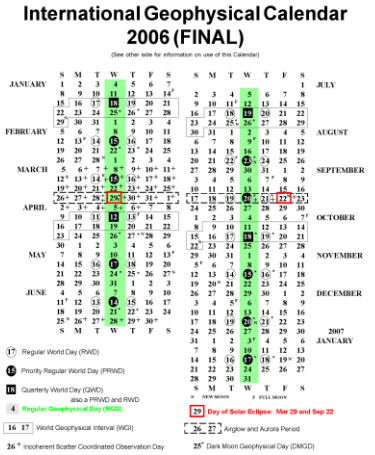
Trans-Ionospheric Signal Loss Due to Solar Protons

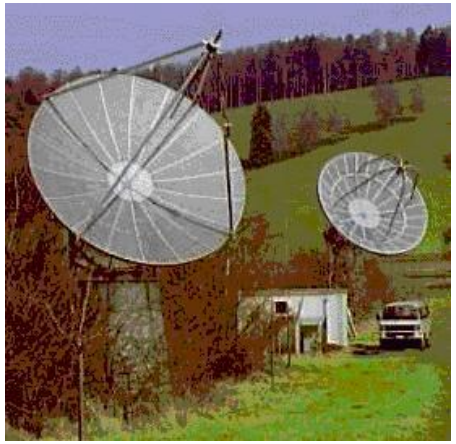
Background: Dr. Herb Sauer and Dan Wilkinson have developed a new technique to estimate high-latitude radiowave absorption. Polar Cap Absorption events or PCAs result from energetic solar protons entering the atmosphere in the less magnetically shielded high latitudes and causing increased ionization which adversely affect radiowave propagation. GOES SEM data are used in conjunction with geomagnetic activity indices to calculate the effects of PCAs on HF/VHF communications.

Significance: The commercial airline industry is required to maintain uninterrupted radio contact during all flights. Concerns regarding lack of radio connectivity forces the airline industry to avoid polar routes when PCAs are anticipated. This tool will assist flight planners in assessing the impacts of solar activity and in selecting optimum routes for safe and efficient air transportation.



STP/SEG Task
Solar Data Services





http://www.ngdc.noaa.gov/stp/SOLAR/solar.html

Background – The Solar Data Services group handles, archives and distributes solar data from the following disciplines; solar phenomena, solar flare-associated events, cosmic rays and solar publications.

Purpose – Provide a permanent repository for solar data to monitor changes in the sun and to track the influences that the sun has on our lives and environment.

Upcoming Milestones

None.

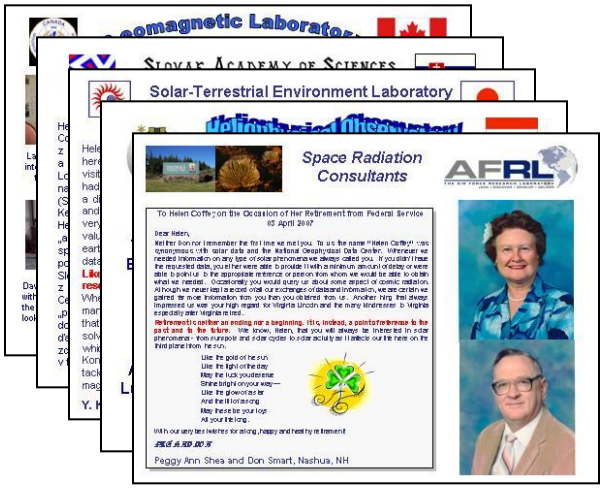
Team Members: Helen Coffey, Ed Erwin, Dan Wilkinson, Chris Wilkinson (EGG)

Status – Helen Coffey has retired but continues as a Guest Researcher. She will continue, in the near term, to generate the International Geophysical Calendar under the auspices of the ISES. Ed Erwin has taken over interim responsibility for the Solar Geophysical Data (SGD) Reports.

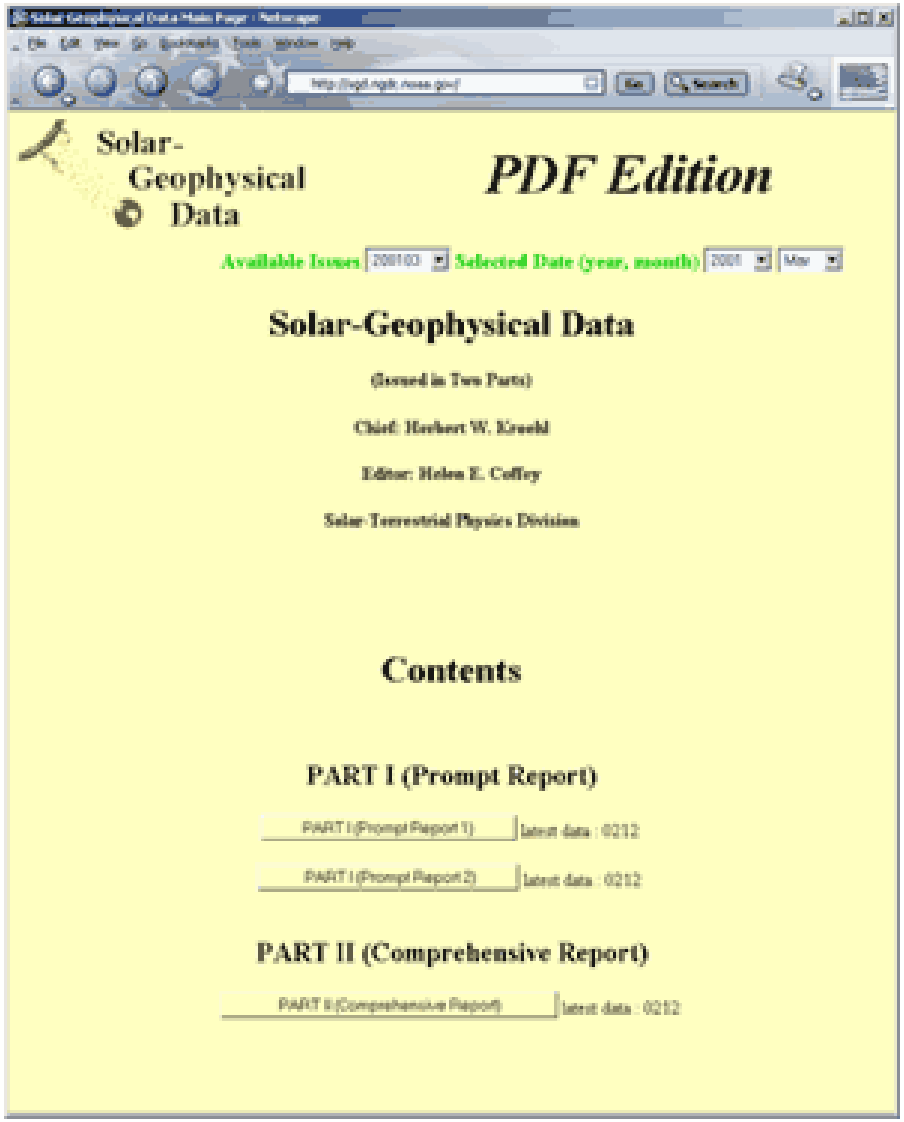
Space Weather program

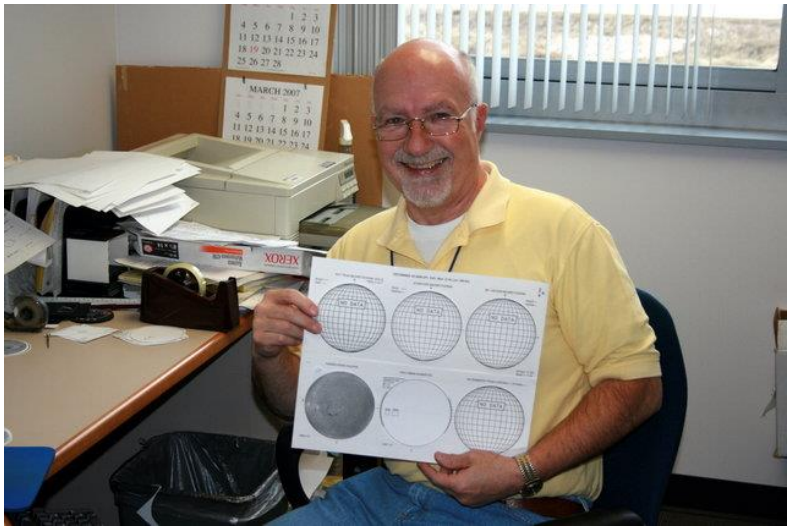
Special Interest Item
NGDC Solar Archivist Retires

Helen Coffey recently retired from NGDC after 35 years of federal service. Ms Coffey was world renowned as the pre-eminent solar archivist. Tributes on her retirement were received from national solar observatories in Canada, the Slovak Republic, Australia, Japan, Hungary and Uzbekistan as well as from scientists across the U.S. Ms Coffey is the recipient of a 2006 Distinguished Career Award for her role in the preservation and sustainment of the nation's solar geophysical data.



Info for the Director
Ed Erwin Picks Up the Slack



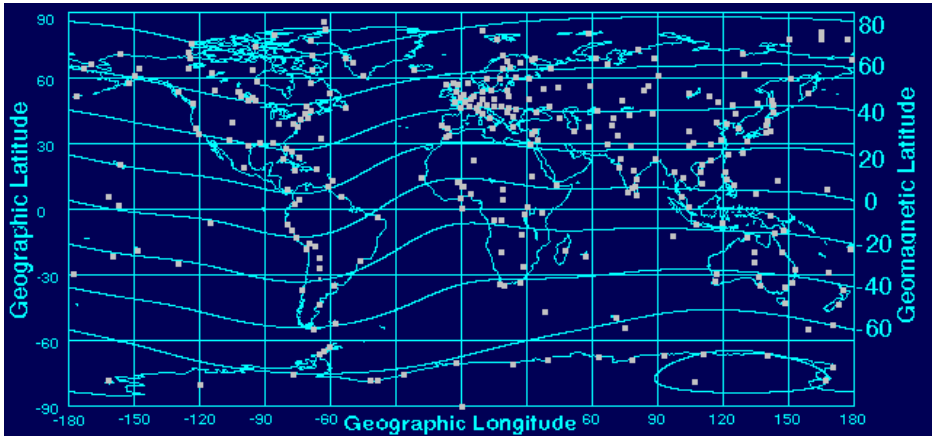


Ed must really like this job!!

Background - Ed Erwin has taken over interim responsibility for the monthly SGD report. SEG is looking to hire an undergraduate student to help with the "busy work". Paperwork for the non-real time data manager has been submitted and appoval for a CIRES space scientist approved.

STP/SEG Task
Ionospheric Digital Database

Global Ionosonde Network



Background – Ionograms are recorded tracings of reflected ionosonde radiowave. Reflected radiowaves provide critical information on the bottomside ionosphere up to the F_2 peak in electron density.

Purpose – Historical ionogram records are used to monitor ionospheric variability and extremes. Efforts are underway to make current measurements available in near real-time to support SWx operations.

Upcoming Milestones

⇨ **4QFY06** – Integrate Mirrion real-time ionospheric access system with SPIDR.

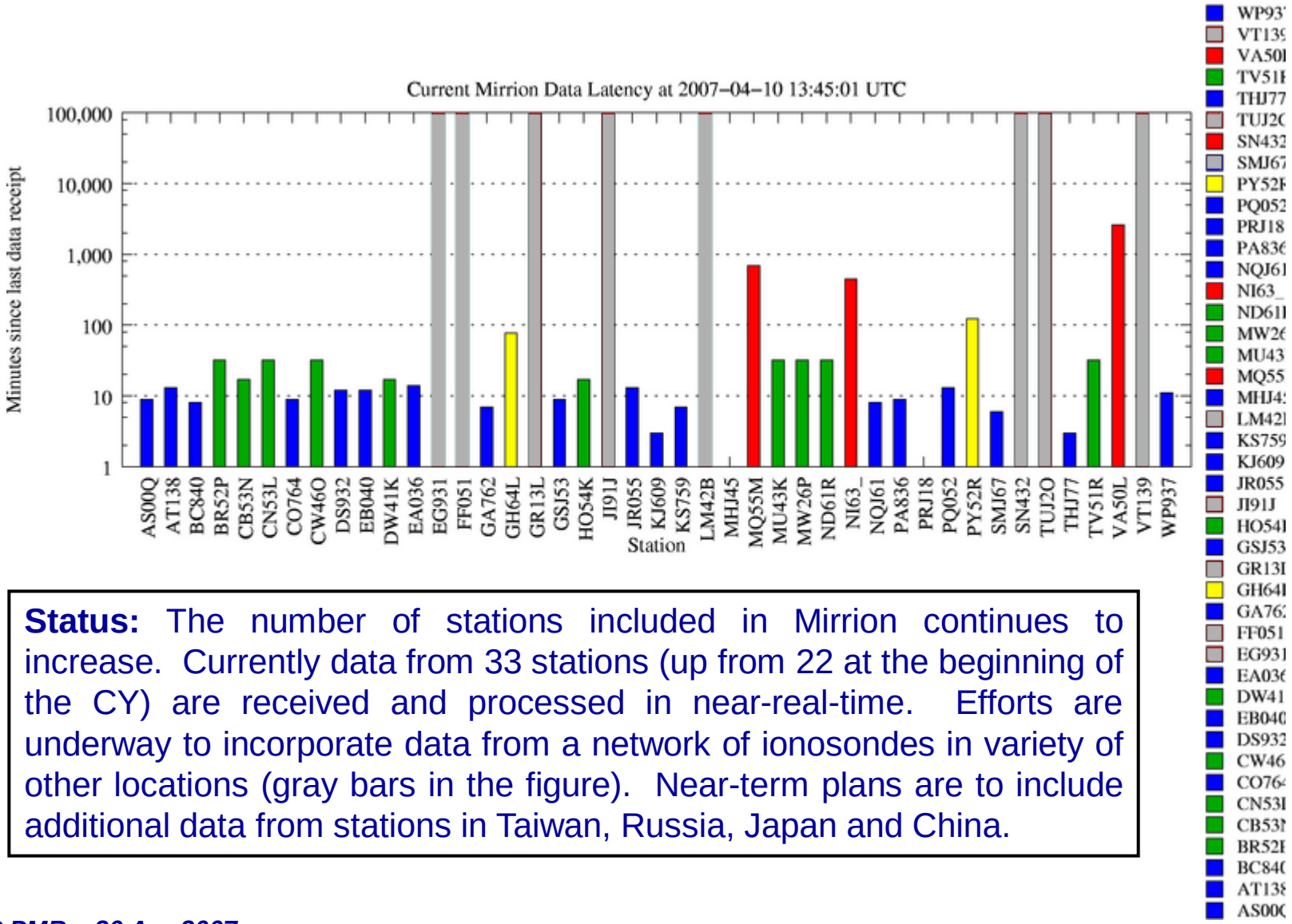
⇨ Milestone in the AOP

Team Members: Rob Redmon, Terry Bullett, Ray Conkright, Justin Mabie

Status: USGS met with NGDC to discuss the possibility of installing ionosondes at magnetometer sites. Interference testing indicates that radiant interactions between colocated magneto-meters and ionosondes are within acceptable limits. CDMP processing of film ionograms continues.

Space Weather program

Info for the Director
Mirrion Station Increases – Up 50%



Status: The number of stations included in Mirrion continues to increase. Currently data from 33 stations (up from 22 at the beginning of the CY) are received and processed in near-real-time. Efforts are underway to incorporate data from a network of ionosondes in variety of other locations (gray bars in the figure). Near-term plans are to include additional data from stations in Taiwan, Russia, Japan and China.

Info for the Director
Ionosonde Deployments

Federal Enterprise Ionosonde Network (FEIN) - Col Mike Condray (AFWA/CC) discussed this during his recent visit to NGDC and requested that NGDC work with his staff on a strategic plan. C. Fox indicated that senior-level buy-in was required for NOAA participation.

USGS science for a changing world

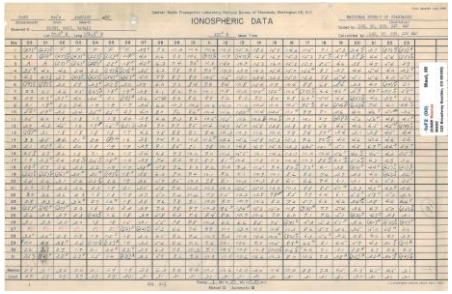
Ionosonde Re-location in Puerto Rico – NGDC and the USGS have done an initial site survey. An MOU for use of USGS facilities, including Puerto Rico, has been drafted and coordinated at the working level. The MOU is about ready for NOAA legal review.[1]

Hosting the USAFA Ionosonde in Guam – NGDC & USAFA continue discussions regarding deployment to a Guam USGS site. An MOU with the USAFA has been drafted and coordinated at the working level. The MOU is about ready for NOAA legal review.[1]

[1]Frequency Authorization for ionosonde operation has been approved

STP/SEG Task
Ionospheric Data Rescue

Paper Records



Data Volume: 190,000

Percent Complete: ~1%

Estimated Done: N/A

Status: CDMP project redirected. Task is currently on hold

Film Ionograms

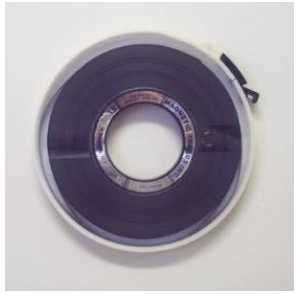
Data Volume: 12,000

Percent Complete: ~.3%

Estimated Done: *TBD*

Status: Kntr issues resolved. 1QFY07 metric was 0.1%

Magnetic Tape



Data Volume: 23,000

Percent Complete: 46%

Completion Date: FY08

Status: In-house task. 1QFY07 metric was 35%. Expected completion in FY08.

Accomplishments
Space Environment Group

- **2 publications in peer reviewed journals:**
  - ✓ **E Kihn – Concurrency & Computation – *Integrating and mining distributed environmental archives on grids***
  - ✓ **W Denig – Annales Geophysicae – *TRANS4: a new coupled electron.proton transport code – comparison to observations above Svalbard using ESR, DMSP and optical measurements***
- **NGDC contributes to solar cycle predictions**
  - ✓ **Close-hold data issued during press release at SWW2007**
- **CIRES/NGDC develops new SWx capability**
  - ✓ **Herb Sauer & Dan Wilkinson – high-latitude radiowave absorption product**
- **Mirrion posts 50% increase in real-time ionospheric data**
  - ✓ **Serving the operational community for space weather data**

Issues & Concerns
Space Environment Group

- **Terry Bullett recalled to AFRL**
  - Retaining Terry is key to the ionosonde program
  - Several “fall on your sword” options being played
- **Outstanding / Pending Vacancies**
  - Paperwork submitted for non Real-Time Data Manager
  - Paperwork in process for CIRES Space Physicist
- **SPIDR support for geomagnetic data A&A**
  - Slow implementation of recommended changes
  - Need to make best use of D. Herzog while we have him
- **Deferred NGDC-SEC Summit**
  - Lack of progress in certain key areas
  - Reconsideration of GOES-13 database replication

OUTLINE
STP Program Management Review

- STP Overview/Status
- Earth Geophysics Group
- Space Environment Group
- Earth Observation Group
- Concluding Remarks

Earth Observation Group
Overview

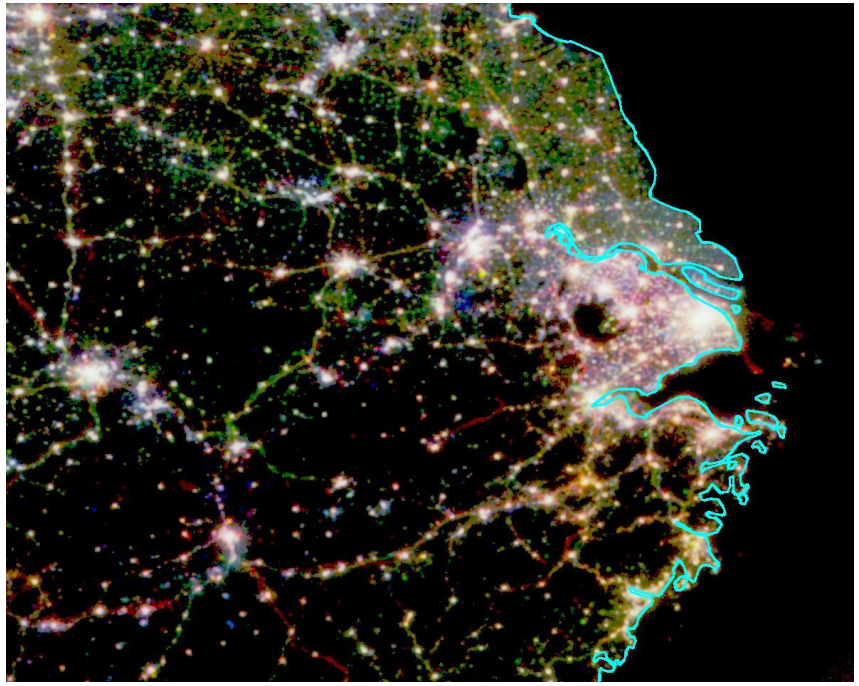
The mission of the EOG is to provide archive data management (ingest, archive and access) for NOAA and other earth observation remote sensing data, development and production of higher-level products, development of data delivery / customer base, and participation with scientific communities

Group Leader: Dr. Chris Elvidge

- **Archive grows 20.5 GB/day[1]**
- **Archive now at ~60 TB[2]**
- **Annual composites are distilled from about 1 TB of geolocated OLS data**

[1]33% increase from 4QFY06

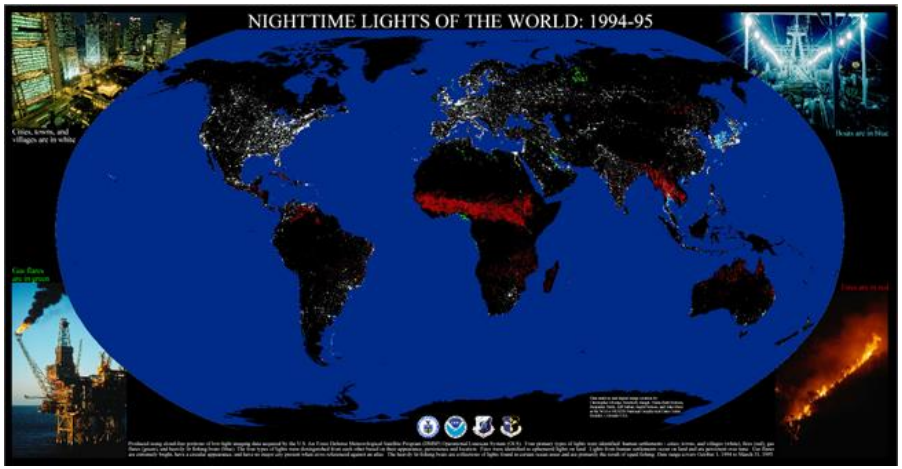
[2]Up from 56 TB @ 4QFY06 - Does not include DMSP "raw" data backup



DMSP-OLS Average visible band DN color composite of Shanghai (2003, 1998, 1992 as red, green, blue)

STP/EOG Task
DMSP Archive, Products & Services

NightTime Lights of the World



Background – DMSP OLS (visible and infrared) imagery from 1973 to present is used to observe lights from cities, fires, gas flares and fishing boats.

Purpose – DMSP NightTime lights are used to map changes in economic activity, population numbers and constructed area. The products are widely recognized as a key satellite observation of humanities presence on the land and ocean surface.

Upcoming Milestones

2QFY07 – Generate 1st global grid of population numbers in poverty from satellite imagery **[Done]**

3QFY07 – Implement near real-time visible and thermal global mosaic generation and online access system for nighttime DMSP Operational Linescan System

Team Members: Chris Elvidge, Kim Baugh, Ara Howard, Ben Tuttle

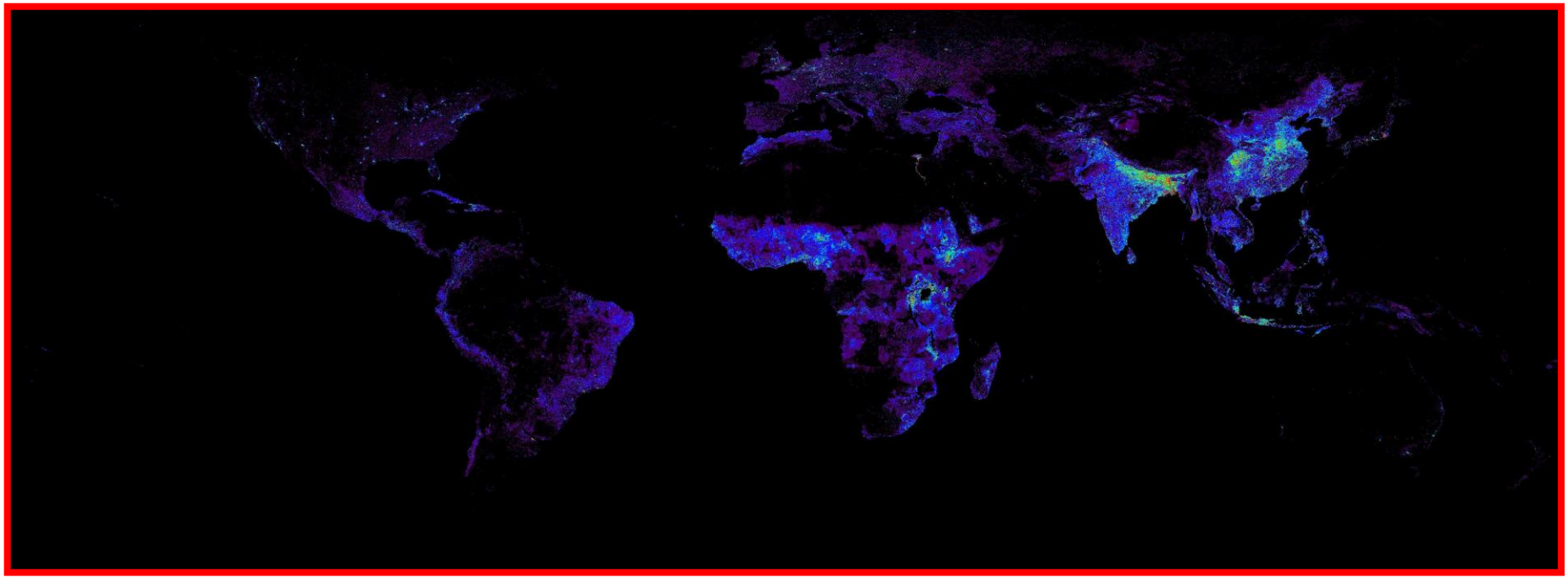
Status: Re-processing of the DMSP nighttime lights imagery is presently stalled. The EOG is critically understaffed.

www.ngdc.noaa.gov/dmsp/global_composites_v2.html

Marine Transportation System program

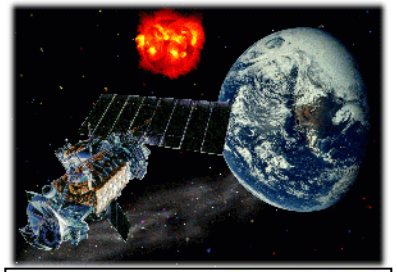
STP/SEG Milestone
Global Grid of Poverty Numbers

Background: DMSP nighttime lights combined with DOE's population density grid (Landscan) to generate the first global grid depicting the spatial distribution and density of people in poverty. In FY07 the product was calibrated using national level poverty data form the World Bank and U.S. Census Bureau.

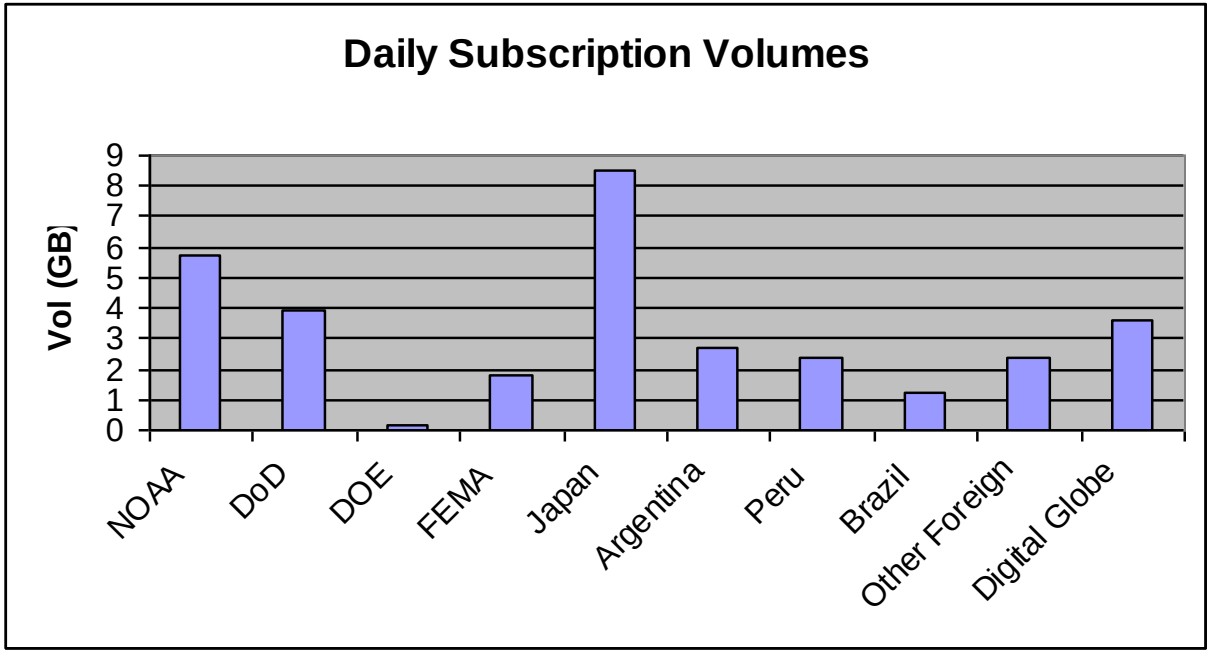


Significance: Until this product was released there had not been a global poverty map. This capability now provides a new spatial dimension for understanding and addressing poverty.

Info for the Director
Subscription Data Volumes (32 GB/day)



Defense Meteorological Satellite Program



NOAA-NESDIS NHIS – 1733 MB
NOAA-NESDIS SAB – 94 MB
NOAA-NESDIS OSDPD – 2968 MB
NOAA-NGDC EDS – 819 MB
NOAA-NGDC STP – 81 MB
WPAFB – 3907 MB
Peterson AFB – 32 MB
DOE – Nellis AFB – 171 MB
FEMA – 1797 MB
Japan MAFF – 2733 MB
Japan EDM – 2747 MB
Japan VTI – 3067 MB
Korea NFRDI – 683 MB
Singapore NUS-CRISP – 1081 MB
India NRSA – 453 MB
British Antarctic Survey – 130 MB
Peru IMARPE – 2345 MB
Argentina CONAE – 2662 MB
Brazil IBAMA – 809 MB
Brazil INPE – 437 MB
Digital Globe – 3592 MB

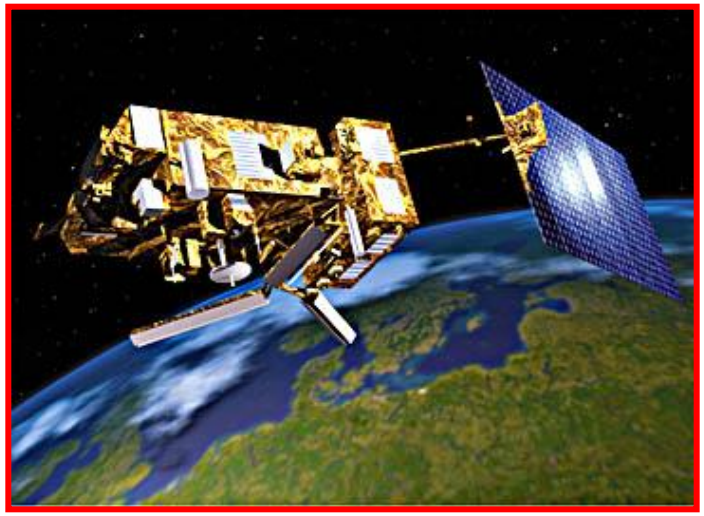
Info for the Director
Low-Light Level Imager on MetOp?

DMSP Nighttime Lights of Europe 2005

Background: The DMSP nighttime lights product from NGDC is optimized for measurements in the evening hours. Continuity of this capability in the NPOESS era is at risk due to loss of VIIRS in the 2130 (LTAN) orbit.

Comment: NGDC has learned that the IPO has engaged EUMETSAT on the possibility of including a low-light level imager on future MetOp satellites. We find this a very promising sign and look forward to assisting the IPO and NESDIS in whatever way possible.

Illustration of the MetOp satellite on-orbit



Info for the Director
The Nightsat Mission Concept

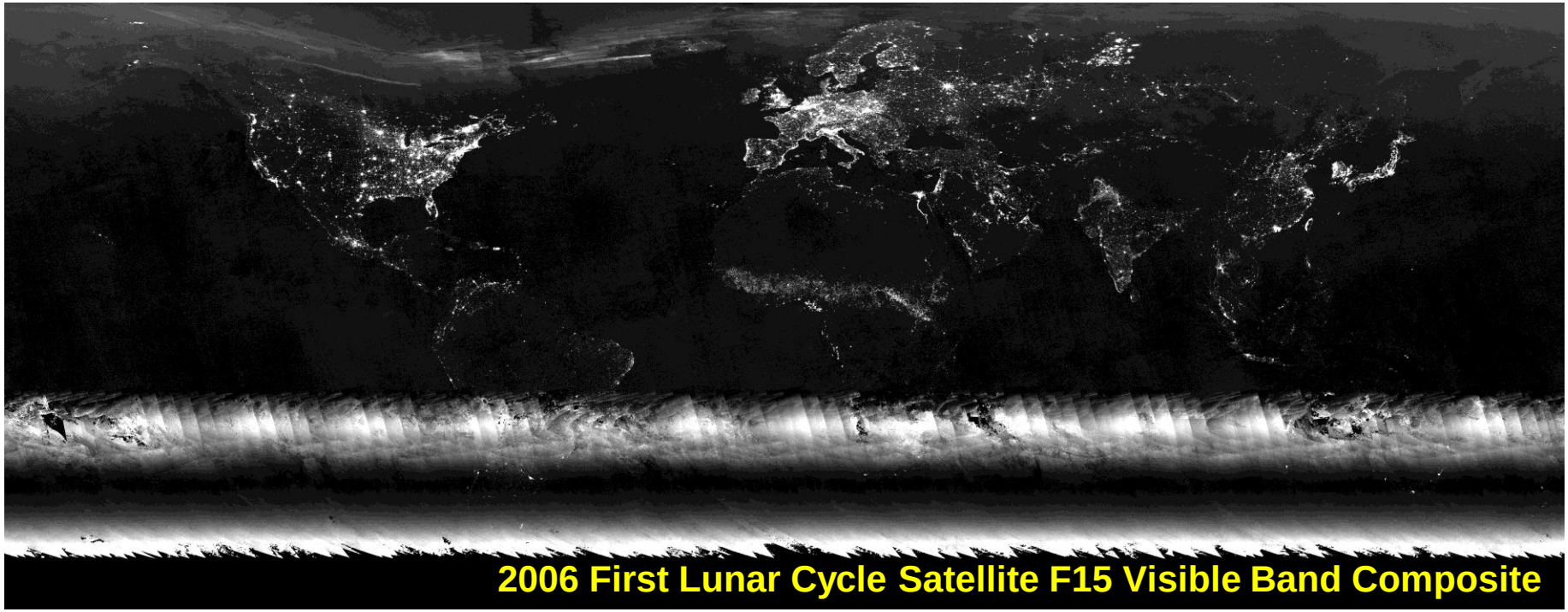
60-m resolution image of Washington DC acquired from the ISS

Background: Through discussions with their user community NGDC has determined that the spatial and spectral resolution of DMSP-OLS and NPOESS VIIRS low light imagery are not adequate to discern urban forms, annual growth rates and lighting types. The EOG in coordination with its partners has developed a Nightsat mission concept to address the inadequacies of the OLS and VIRS sensors. The requirements for the Nightsat mission concept have now been specified in terms of spatial resolution, detection limits, spectral bands, and orbital repeat cycles for the global mapping of nighttime lights. A descriptive paper for the Nightsat concept is currently in press for the International Journal of Remote Sensing.

Comment: A Nightsat would address the NRC Decadal Survey recommendation for a capability to monitor the "human footprint" and human activities from space.

STP/EOG New Product
Lunar Cycle Composite Production

Background: DMSP OLS visible-light imagery can be used to produce near real-time lunar cycle composites. Prototype product under development for WPAFB.

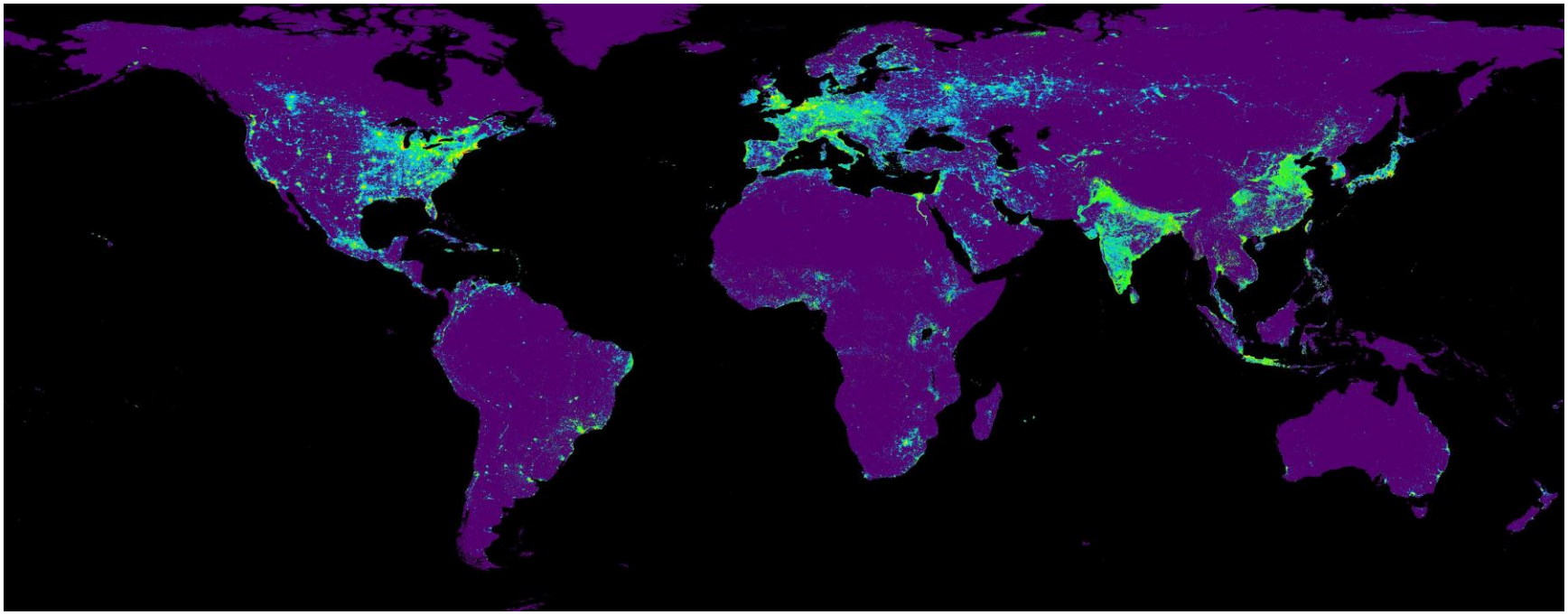


2006 First Lunar Cycle Satellite F15 Visible Band Composite

Significance: Web coverage service will enable users to extract rectangular areas of interest. Anticipated users from FEMA, DoD, national fishery agencies, fire management agencies and other national disaster agencies.

STP/EOG New Product
Year 2000 Global ISA Grid

Background: EOG combined radiance calibrated nighttime lights with DOE's population density grid (Landscan) to generate the first global grid depicting the spatial distribution and density of constructed impervious surfaces (ISA). Development funded by NASA's carbon science program.



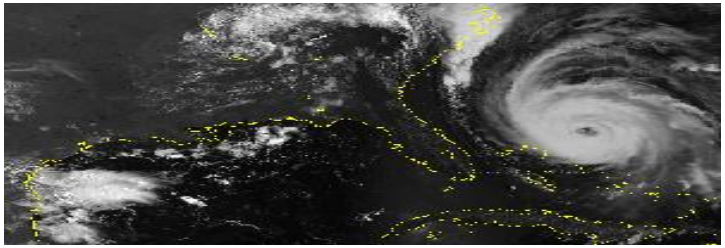
Significance: This is the first global ISA grid. ISA grids are used in flood prediction, modeling urban heat islands and ground water recharge.

Available at http://www.ngdc.noaa.gov/dmsp/download.html.

STP/EOG New Product
On-line Web Coverage Service (Demo)

Background: The EOG group has established an open source web coverage demo that allows users to view global satellite data products, select their geographic areas of interest, select from a list of available images, and download the requested images in geotiff format.

Significance: User service provides access to daily mosaics, lunar cycle composites, and annual composites. Longer term aim is to allow subscribers to establish and manage their own subscriptions.



Available at http://www.ngdc.noaa.gov/eog/maps/cgi-bin/public/ms/gcv2/dl

Accomplishments (2QFY07)
Earth Observation Group

- **2 manuscripts in press and 1 in review with peer-reviewed publications**
- **Plenary presentation on nighttime lights given in URBAN 2007 Workshop, 11-13 April 2007, Paris**
- **Global poverty and ISA grids posted for access at the EOG web site**
- **Prototype web coverage service developed to provide access to DMSP global products**

Issues & Concerns
Earth Observation Group

- **2 CIRES new hires required to backfill Hayes & Howard**
  - ✓ **Product generation & software developments currently stalled due to staff shortages**
  - ✓ **Reprocessing of DMSP data from 1992-2005 currently on-hold. OLS orbital data no longer accessible online**
- **EOG would like to migrate the archive DMSP OLS to CLASS (per L1L requirements)**
- **The National Park Service Nightsky Team has expressed interest in co-locating with EOG**

OUTLINE
STP Program Management Review

- STP Overview/Status
- Earth Geophysics Group
- Space Environment Group
- Earth Observation Group
- Concluding Remarks

Concluding Remarks
STP Program Management Review

METRICS (2QFY07)

- Peer Review Publications: 6 (including 4 in-press)
- Conference Proceeding/Reports: 3
- Presentations: 12 (3 eGY, 2 SWW2007, 1 AAG, . . .)
- Milestones: 4 Completed (4 this Quarter)

ISSUES

- Terry Bullett – Recall to AFRL - Impacts to iono prgm
- CORS – Watch items for Internet Collector & OPUS
- Personnel – 2 actions submitted; 3 pending
- STP Budget Analyst – Limited front-office personnel
- Upcoming visit by DMSP SPO – 16 May